The Iron Age

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XI: No. 23. | *New York, Thursday, June 5, 1873.* | Four Dollars a Year. Single Copies, Ten Cents.

On a Method of Preventing Shocks in Reversing Rolling Mills.*

The writer, after reviewing the various plans proposed for preventing shocks in reversing rolls, said it was not his wish to place his system in competition with those suggested by Walker, Bladen, Ramsbotton, Kitston, Napier, and others, the merits of which he fully and freely acknowledges. It is merely as an alternative scheme that he invites attention to it; that is, one which may be found applicable in cases where other expedients would be inadmissible, and as peculiarly suitable where it is desired to improve existing old fashioned reversing gears with minimum loss of time and expense. The application of Mr. Ramsbottom's system under such circumstances would evidently involve a complete revolution of engines and gearing. In the system of both Messrs. Napier and Stevenson, a minimum distance of 5 ft. inside face to inside face of the two loose spur wheels is stated by them to be absolutely necessary. Less than that will not suffice for the introduction of the requisite apparatus. Now there are many reversing mills at present at work on the original clutch system where that distance is less than 5 ft., and in such cases I am at loss to perceive how either of the aforesaid systems can be adopted without completely remodeling the foundations, bed plates, and shafts, as well as the spur gearing. In the two ordinary sets of reversing gear at the Newport Rolling Mills, Middlesbrough, which are types of what is usual in the Cleveland district, the dimension referred to is only 2 ft. 11½ in. instead of 5 ft., and could not be increasedwithout forcing the wheels into contact with the stone work on either side. The plan of the writer has been specially devised for the conversion of such existing reversing gears into thoroughly efficient ones, without any fundamental alteration, and without rendering useless any of the existing parts. The plan consists of the introduction of a loose face between each loose wheel and the clutch. These loose wheels are bored out to the same diameter, and are carried upon the same portion of the loose axle as the spur wheels with which they are in contact. Cast in them are recesses corresponding to and engaging with the claws of the sliding clutch, instead of those claws being made to engage as heretofore with recesses in, or claws upon, the inner faces of the loose spur wheels themselves. Each loose face is made in two halves firmly bolted together, so that one or both halves may readily be removed and replaced whenever necessary. Cast in the back of each half of each loose face is a recess or pocket into which is firmly secured an arm or lever composed of bars of spring steel, and somewhat resembling one-half of an ordinary bearing spring, such as surmounts the axle box of a locomotive. The extremity of the spring arm is held in a socket attached to the inside face of the loose spur wheel with which it is in contact.

In the act of reversing, the clutch is thrown to one side or to the other, in order to communicate to the shaft upon which it slides the motion of either of the loose spur wheels with which it engages, and which by means of the wheelwork behind them are permanently rotating at constant speeds in opposite directions. Precisely the same takes place under the improved system, except that the loose shaft acquires motion, not direct from claws solid with the rotating spur wheel, but only as the force in the run thereof can be transmitted to it through the two spring arms attached to the loose face. These spring arms yield to a certain extent just as does the spring drag hook of a locomotive, when it suddenly endeavors to set in motion a heavy train.

In ordinary reversing gears, the momentum of the loose spur wheels, the other wheels and shafts connected with them, and the heavy fly-wheel upon one of those shafts, all rolling at a considerable velocity, cannot suddenly be checked without mischief. On the other hand, the loose shaft with the clutch upon it, and the rolls, spindles, and boxes in connection with it, cannot be set into rapid motion from a state of rest, and this operation repeated several hundreds of times a day, without eventual destruction. By the introduction of the spring arms, as shown, the only dead weight, which is made suddenly to change its state of comparative motion is the loose face, the weight whereof is comparatively small, and which, being made in preference of cast steel or wrought iron, is well calculated to endure for a considerable length of time. Or if saving of first cost be an object, the loose face will be greatly more enduring than the sliding clutch in ordinary gears, even if made of cast iron; and in case of failure can be replaced by a duplicate in an hour or two. The weights which are suddenly set in motion from a state of rest in this and in an ordinary reversing gear, adapted in both cases to a 22-in. plate mill, are as follows, viz.:

In the improved reversing gear:

	Tons.	Cwt.	Qrs.
One loose face weighing	1	10	0
In an ordinary reversing gear:			
Loose axle	2	0	0
Sliding Clutch	1	11	8
Fast and loose crabs attached to the end of the loose axle	1	12	2
Total	6	4	1

But this comparison, even though 4 to 1 in favor of the improved gear, does not fully show its advantage. To be set in motion at each reversing, there are, beside the 6 tons 4 cwt. 1 qr. above named, the following, viz.:

	Tons.	Cwt.	Qrs.	Lb.
Four cylinders	1	7	0	0
Seven boxes	3	1	1	0
Two pinions	3	14	0	18
Three rolls	13	4	0	0
Total	27	10	2	18

Without taking into account the upper chilled roll, which is usually left uncoupled. Now, although the 6 tons 4 cwt. 1 qr. in solid contact with the loose axle is set into motion suddenly at each reversing, it is generally supposed that the remainder, amounting to 21 odd tons, acquires motion only piece by piece, or by a succession of blows, owing to the slackness of fit between the coupling boxes and the spindles and the ends of the rolls.

In setting in motion so considerable a weight as 21 tons, it is obviously better to do it by a series of blows, or shocks, than by a single one; still, all shocks are mischievous, and only to be resorted to in cases of dire necessity. By introducing, as in the method under consideration, springs between the unrelenting fly-wheel and the point of ultimate resistance, every one of these minor shocks is mitigated, as well as the initial one produced by throwing in the clutch. The proportion of a revolution which the spring will yield is about 1-40th. Contrary to the opinion expressed by Mr. Stevenson, I cannot but regard this as ample, especially when I remember the behavior of railway springs under the various conditions to which they are subject. I have taken numerous diagrams with a view of ascertaining the amount of power absorbed by plates passing through rolls. The maximum force I have ever found to be exerted in rolling an ordinary plate amounted to a load of 17 tons upon the engine piston moving at the rate of 272 ft. per minute. This will be found equivalent to 7½ tons, exerted at the extremities of the two spring arms, or 3¾ tons upon each. The spring arms at their roots are composed of 44 plates 3½ in. wide and 5-16 in. thick. The total thickness of the layers of plates amounts to 14 in., and according to the usual formula derived from experience with locomotive springs, viz.:

$$L = \frac{BT^2N}{11.3\,S}$$

where L = safe load in tons.
" B = breadth of plates in inches.
" T = Thickness of plates in 16ths of an in.
" S = span of spring in inches.

They are as safe as locomotive springs ordinarily are, even when subjected to the maximum strain which can ever come upon them in rolling. Should, however, the spring arms have failed to impart their motion to the sliding clutch and loose axle, after having yielded as much as they are capable of, as might conceivably be the case if a stoppage occurred at the rolls; then certain projections upon them would come in contact with safety claws secured, as shown, to the arms of the loose wheels. This plan prevents any change which might otherwise arise from breakage of the spring arms, or from their being drawn out of their sockets at their extremities. If the loose faces come in contact with the safety claws as described, they become solidly united to the loose wheels, and in such cases the reversing gear becomes, for the moment, similar to the original ones now in common use. In the case of the smaller loose wheel, it is necessary to carry out brackets beyond the diameter of the wheel to engage the ends of the spring arms in contact with it in order to obtain a sufficient length for elasticity, and in order to make the same duplicates applicable to either wheel. The spring arms with brackets might, in this case, be sometimes found to interfere with the outer carriage of the fly-wheel shaft supporting the middle pinion. If it should be inadmissible to work that pinion over neck, the difficulty could be got over by simply moving the carriage a little further from the pinion, and allowing the spring arm to work in the space between, close up to the naked fly-wheel shaft. The reversing gear which I have now described is not yet in practical operation, but it is intended shortly to test it at the Newport Rolling Mills. The model which is before you is, however, quite sufficient to illustrate its action. Upon the end of the loose shaft a fly-wheel is keyed to represent the inertia of the train of rolls. It will be seen that the loose shaft, with the fly-wheel thereon, can be set in rapid motion from a state of rest, and with great suddenness, without any appreciable shock. Were it not for the spring arms a smart blow would be audible throughout the room every time the clutch was thrown in under similar circumstances. It is, perhaps, worthy of remark that this reversing gear and that of Mr. Napier are the only modern improvements in that direction which admit of being operated by levers worked together by manual power—that is, without the intervention of steam or hydraulic apparatus.

The total cost of the new parts necessary for altering an existing ordinary reversing gear to the plan here advocated is as follows, taking present prices of material and labor.

	tons.	cwts.
Two loose faces weighing	3	0
Six brackets for engaging ends of springs	1	5
Total	4	5

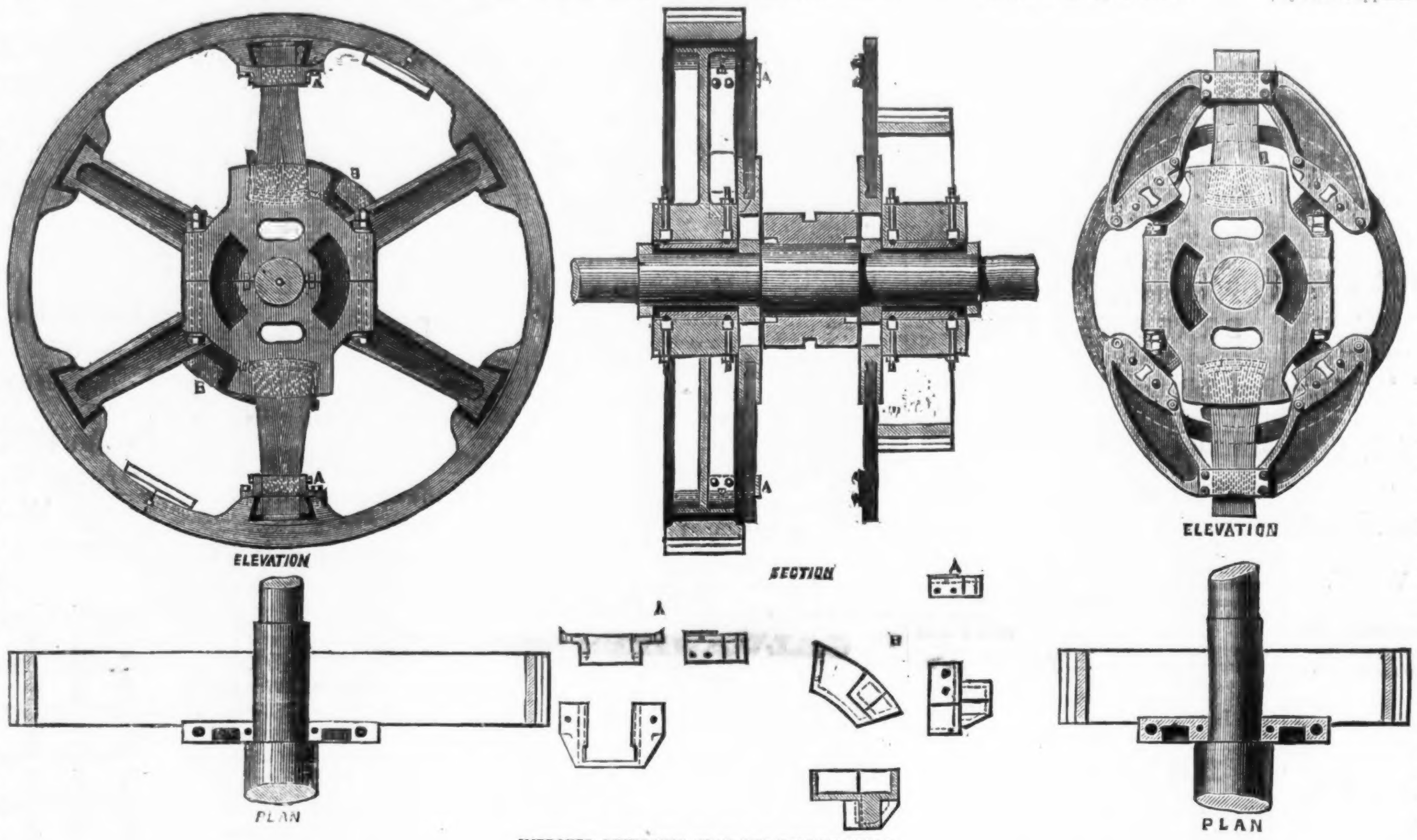
	£	s.	d.
Of casting, at say £10 per ton	42	10	0
Bolts and wrought iron work, say 5 cwt at 56/	14	0	0
Four spring arms, 1 ton, at say 40/ per cwt	40	0	0
Fittings, turnings, &c., say	33	0	0
Total	129	10	0

If the lower faces be made of cast steel or wrought iron, instead of cast iron, as just estimated, a proportionate addition to the cost will be incurred.

There would be a still further expense in cases where the gear to be altered was less favorably arranged than here supposed.

But it is, perhaps, unnecessary to complicate our estimate with items for contingencies which might or might not arise, and if they did, would vary in each case.

I have now only to add that I have not patented this improvement, and if any of the members of this institution think it of value, they are welcome to make what use of it they please, and if I can assist with any further information it will afford me great pleasure to give it.



IMPROVED REVERSING GEAR FOR ROLLING MILLS.

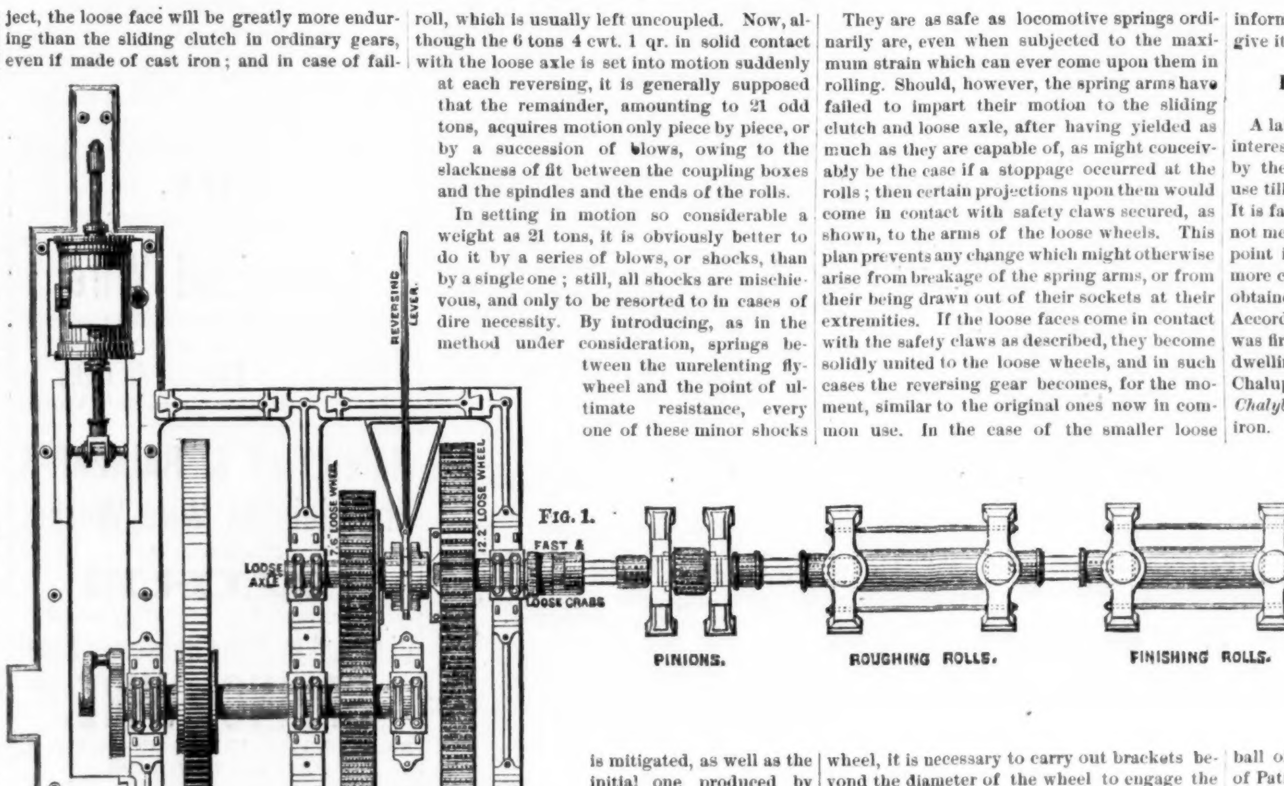


FIG. 1.

* Abstract of paper read before the Iron and Steel Institute, by Mr. Jeremiah Head, of Middlesborough.

Iron and Steel in Early Times.

A late number of *Nature* gives the following interesting notes on the use of iron and steel by the ancients: "Iron was not in common use till long after the introduction of copper. It is far more difficult to procure, because it is not met with in the native state, and the fusing point is very high. The metallurgy of iron is more complex than that of copper, and when obtained it is a more difficult metal to work. According to Zenophon the melting of iron ore was first practiced by the Chalubes, a nation dwelling near the Black Sea; hence the name Chalups used for steel, and hence our word *Chalybeate* applied to minerals water containing iron. Steel was known to the ancients, but we do not know by what means it was prepared; it was tempered by heating to redness and plunging in cold water. According to some, kuanos mentioned by Homer was steel; but Mr. Gladstone prefers to conclude that it was bronze. Iron was known at least 1537 B. C. It was coined into money by the Lacedæmonians, and in the time of Lukourgos in common use. It was used in the time of Homer for certain cutting instruments, such as woodmen's axes, and for plowshares. Its value is shown by the fact that Achilles proposed a ball of iron as a prize for the games in honor of Patroklo.

Neither iron money nor iron implements of great antiquity have been found, because, unlike the other metals of which we have spoken above, iron rusts rapidly, and soon comparatively disappears. No remains of it have been found in Egypt, yet Herodotus tells us that iron instruments were used in building the pyramids; moreover, steel must have been employed to engrave the granite and other hard rocks, massive pillars of which are often found engraved most delicately from top to bottom with hieroglyphics. Again, the beautifully engraved Babylonian cylinders and Egyptian gems, frequently of cornelian and onyx, must have required steel tools of the finest temper. We have no record of the furnaces in which iron ore was smelted, but we know that bellows were in use in the 15th century B. C., in Egypt, and some crucibles of the same period are preserved in the Berlin Museum. They closely resembled the crucibles in use at the present day." We may add that Mr. Layard found an iron saw at Ninevah.

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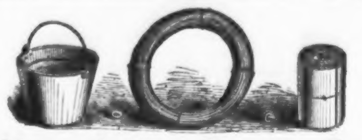

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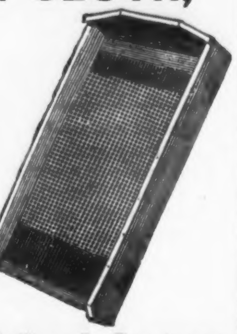

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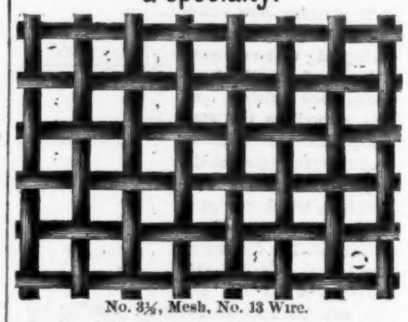

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10	3.47	40	11	3.20	38	12	2.80	35	14	2.43	33	16	2.00	30	18	1.39	30
11	2.75	32	12	2.45	31	13	2.15	30	15	1.97	30	17	1.47	25	19	1.08	25
12	2.10	26	13	1.85	25	14	1.62	25	16	1.51	25	18	1.11	20	20	0.76	20
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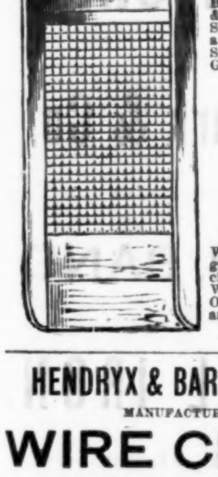
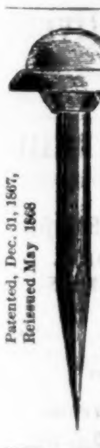
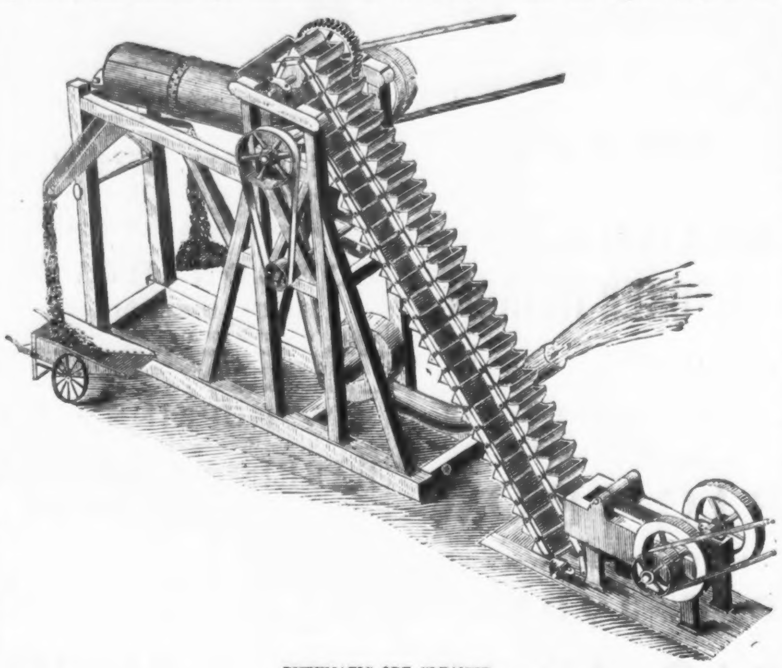




Pneumatic Ore Cleaner—The Dry Air System.

This system, illustrated in the accompanying cut, though simple, accomplishes the cleaning of ore by means never before applied to this purpose. The combinations of the frictional effect of the revolving cylinder and the exhaust fan have been found practically successful during a test of nearly six months at the works where the original machine was erected; and while several modifications may be necessary to meet the requirements of ores containing various quantities of light material of dif-



PNEUMATIC ORE CLEANER.

ferent specific gravities, the inventor thinks that he can make machines under his patents which will thoroughly clean most ores that have been completely dried. The system merits the notice of ironmasters, particularly those wishing to make superior foundry iron, and who, desiring entire purity in their pig, resort to the roasting or calcination of their ores as being in the direct line of economy. Notable instances of careful preparation of ores by calcination are found in the Cleveland District, of England, where, notwithstanding the very great hight of the furnaces, large sums have been expended in building calcining ovens. The most celebrated of the Scotch furnaces, whose foundry irons are always in demand at high prices, not only calcine thoroughly, but hand pick their ores, the extra labor being, as in almost all manufactures, amply repaid; whereas those who shovel in "anything to fill up" their ore charges, usually have to take what they can get for their inferior, low grades of metal resulting from badly handled ores. In many instances other causes are made to bear the blame, when sufficient care in eliminating impure matter would show results for which proprietors are not prepared. The proper way is to watch all the points of expenditure in making iron, and one often overlooked is the wasting of valuable fuel on irreducible silex and inconvertible clays, dust, etc., which consume fuel, reduce the quantity, and injure the quality of the iron made, by causing mine falls, gray chills, and reduction of temperature, which are of uncommon occurrence when the "food of the furnace" has been properly prepared. The operation of the pneumatic ore cleaner is, briefly, as follows: The ore being crushed by a Blake crusher, or any other means, is delivered into the elevator buckets, which in turn discharges it into the hopper, and from thence into the revolving cylinder, where it is carried up by means of strips or shelves, secured to the inside of the cylinder, and dropped through its diameter, thereby keeping up a shower of ore within. The cylinder being inclined, causes the ore to approach the open end every time it is dropped, until it is discharged into the spout, thence into the barrow or the opposite side, as desired. But while the ore is being showered through the diameter of the cylinder as described, by its rotary motion, the exhaust fan keeps up a strong current of dry air through the cylinder and falling ore, carrying with it all the dirt or light material with which the ore is mixed, and discharges it at the end of the pipe, leaving the ore clean and dry. This apparatus, which is adapted for the cleaning of other than iron ores, will soon be brought into use at several furnaces in different parts of the country which have already ordered them. Mr. J. H. Hillman, of Trigg Furnace, Kentucky, is the inventor and patentee.

New Patents.

We take from the records of the patent office at Washington the following specifications of certain patents lately issued, which will be found interesting:

IMPROVEMENT IN CUPOLA FURNACES.

Specification forming part of Letters Patent No. 138,184, dated April 22, 1873, issued to John B. Pearse, of Swatara, Pa.

This invention relates to the construction of cupolas, and to the means of conveying the molten metal away from them to the point where it is used. In this latter application it relates equally to air furnaces. The improvement consists in an improved method of constructing the opening—or, rather, that part of the cupola in which the opening is made—from which the molten metal is tapped or let out. It also consists in an improved method of constructing the runners by means of which the molten metal is conveyed away to the point where it is used.

As cupolas have heretofore been constructed, they have consisted merely of five general parts—first, a frame, consisting of four legs and a cast iron circular or elliptical—according to shape of the cupola—flanged plate, which is laid on the legs, and has an opening of large size in its center. To close this opening when the cupola is in use, swinging doors are fitted to the flanged plate; second, a wrought iron exterior shell, resting upon the flanged plate just described; third, a fire brick lining, built inside of, and in contact with, this wrought iron shell; fourth, a convenient number of tuyeres to convey air into the cupola when in use; fifthly, a wrought iron runner of U form, bolted to the wrought iron shell, and leading away from the same. This runner is invariably lined with loam, or with a mixture of molding sand and plastic clay of considerable thickness—often four inches thick—with the object and for the purpose of protecting the wrought iron runner from being burned away by contact with the molten metal running through it. Just where this runner leaves the cupola there is a simple opening made by leaving a fire brick or two out of the lining, and filling the space so made with sand, leaving a hole of convenient size for the molten metal to flow through.

When the cupola is used the swing doors are raised so as to close the opening in the cast iron flanged plate forming the bottom of the cupola, and the doors are then covered on the inside with sand to a depth of about six inches.

Heretofore it has been customary to make a hole of various forms in the fire brick lining where the runner joins the cupola, and to make a corresponding hole in the wrought iron shell. This opening is usually six to eight inches wide, by ten to twelve inches high. When the cupola is used a lump of coal is so placed behind this opening that the latter may be rammed full of refractory material, preferably molding sand. This filling is usually as thick as the cupola-lining—say, six to nine inches—and is called the "breast" of the cupola. Through it the tapping hole is made, out of which the molten metal is let or tapped when a sufficient quantity has been melted. This practice has certain radical defects, which prevent the cupola from being worked longer than twelve to fourteen hours The breast of molding sand or other material melts away so as to become dangerously thin, and allows the molten metal to break through it and escape to waste. Further, the tapping hole gradually enlarges itself to the shape of a funnel, opening out toward the interior of the cupola. As the sand melts and is worn away the funnel becomes larger and larger, till the hole becomes too large to be conveniently closed by any usual means.

Further, the usual method of making up the runners by lining the wrought iron trough with a refractory mixture is a very imperfect method. It is very difficult to get a good lining, as refractory material fit for the purpose shrinks strongly, causing cracks, which must be carefully filled. Again, the molten metal is always accompanied out of the cupola by more or less molten slag or scoria. This slag takes hold of the sand lining, sticking to it to such an extent that the runner, after being used five or six hours, gradually fills up. If, now, we try to remove this concretion of slag and sand it tears away with it a great part of the lining of the runner, so that the latter must be relined with care before any more molten metal can be run through it. This operation takes from one to two hours, just at the time the cupola or furnace should be busiest, and, beside causing loss of time, the stoppage cools off the heat of the cupola so much that often an entire stoppage ensues till another cupola can be got ready.

All these troubles are extremely annoying and unprofitable, and are of such character as to seriously diminish the capacity of a cupola or furnace.

The improvements herein described entirely remove all difficulties with the runner and the breast and tapping hole, and enable a cupola to be run as long as may be convenient or be desired.

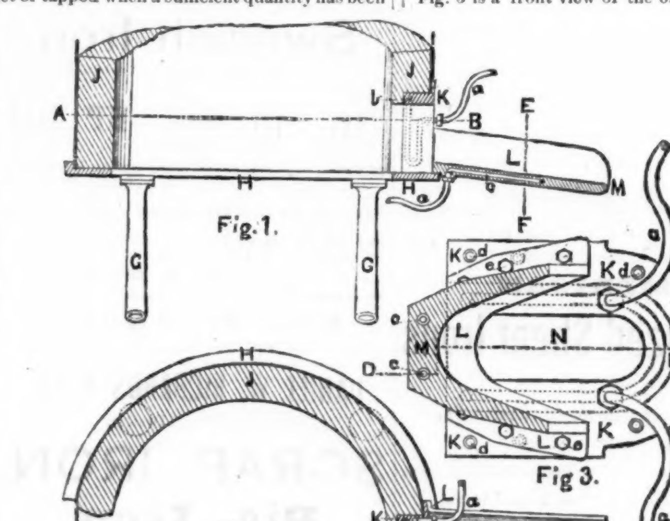
Figure 1 shows a general section of the cupola, breast block, and a short runner. Fig. 2 shows a section of the cupola and breast block on the line A B, Fig. 1. Fig. 3 is a front view of the breast block with the runner bolted to it, the runner being shown in section as cut by line E F, Fig. 1.

Fig. 1 represents the general section of the bottom of a cupola, of which G G are the legs; H, the annular, circular, or elliptical flanged plate; I, the wrought iron shell; and J, the fire-brick lining. K is the breast block—that is, the casting—which is shaped like an inverted U, and surrounds or forms the breast opening. The exterior side of the breast block K has a flange, which is bolted or riveted fast to the shell of the cupola. The breast block is cooled off by means of the wrought iron pipe *b* cast in it, with a number of folds upon itself, as shown. The pipe *b* is fed with water by the gum hose *a*, and, beginning at the outside, runs in for an inch, then down to the bottom of the breast block, where it turns inward and upward, and running up and through the top of the block to the other side, where it runs down on the interior, and there turns up and out, and is connected at its exit from the block with a similar hose, *a*, to carry the water away. The circulation of water keeps the block cool; and as the sand-breast is made up in the opening of the block the breast is kept cool as well, and is prevented from melting away, as it otherwise would. The length of time the breast and tapping hole in it can be used is thereby indefinitely extended.

The runner used in connection with a cupola may be of any length; but for purposes of illustration a short runner, L, is shown in Fig. 1. M represents the metal in the bottom of the runner, of cast iron, and *c* is a pipe cast in the bottom M for a short distance from the cupola.

Fig. 2 is a section of the cupola and breast-block K on the line A B, Fig. 1. H is, as before, the annular flanged plate; I, the wrought iron shell; and J, the refractory lining. L represents a plan of the short runner, looking down upon it, while the cooling tube *c*, Fig. 1, is shown by dotted lines. K is the breast block, and the cooling pipe *b b b* is shown as it appears in this section of the block. The letters *a a* represent the gum hose previously described. N is the opening left for the breast of sand, and is preferably made seven inches wide, so as to allow the water circulating through the breast block to exercise sufficient cooling action on all parts of the breast.

Fig. 3 is a front view of the breast block K, and of the runner bolted to it. The runner is shown partly in section on the line E F, Fig. 1. The heads of the bolts or rivets, by which the flange of the breast block K is fastened to the iron shell of the cupola, are shown by the letters *d d*. L L designates the runner, as before, while *e e* show the heads of the bolts, by means of which the runner is fastened to the breast block. The letters *c c* designate the cooling tube as it appears in this section of the runner. N represents, as before, the opening (of the breast block) in which the breast is rammed.



IMPROVEMENT IN CUPOLA FURNACES.

When a cupola is about to be used the swinging doors are closed, covered with sand, and the whole bottom part of the cupola is then filled with coal, which is set on fire. When the coal is thoroughly ignited, and the cupola well warmed up, a lump of coal is put against the inside of the breast hole in such a position that the sand may be rammed against it. The tapping hole is made by putting a roundtube or bar (of the proper diameter) into the sand before it is rammed fast. After the breast is finished the bar is withdrawn, leaving an open hole. The blast is then put on the cupola, and the tapping hole is kept open till the molten metal begins to run out. When this occurs the water is turned into the cooling tube of the breast block to keep it cool, and the tapping hole is closed. From this time on the water circulates continually in the block in order to keep the sand breast cool. When sufficient metal has been melted the tapping hole is opened, and the metal is allowed to escape into the runner. The runner may either be a short one, five to eight feet long, and leading into a ladle or a receptacle of any kind prepared for the accumulation of the metal for use, or the metal may be run through a runner of any desired length to the point where it is to be used. One of these runners may be run to any distance, though two hundred feet is as far as will generally be convenient. The improvement furnishes in its cast iron runner one that is always ready for use. The only preparation the cast iron runner needs is that it be roughly daubed over with the so-called "clay wash" of the foundries, a mixture of yellow clay, water and facing, the two first ingredients being commonly sufficient. After this is done the cast iron runner, as above described, can be used continuously for a week, if necessary. If the slag that accompanies the iron sticks to the iron at all it may be removed, and the small amount of clay wash required to renew the film of clay may be daubed on and dried in five minutes by the heat of the runner. When, by the continuous running of large quantities of metal, the runner is heated very much, a cooling tube, *c*, may be used to cool down the hot metal of the runner. The thinner the cast iron of the runner is made the less need will there be to use the cooling tube. If the quantity of metal run through the runner in an hour does not exceed ten tons a cast iron runner of a thickness of two inches will be sufficiently cooled by the air. It is only when the quantity of metal exceeds fifteen tons per hour that the continual use of water in the cooling tube is necessary.

It is, of course, evident that sometimes runners of extreme length may be required where cast iron or other metal is melted for use. In such cases it often happens that it is necessary to collect the metal in a ladle or other receptacle placed near the cupola, instead of being run directly away to be used. In such cases the runner is connected with the ladle as well as with the cupola or furnace. The runner may be in one continuous line or be broken by the interposition of a ladle or pool at any convenient point.

These improvements may be used in a Bessemer works to very great advantage, because, on the one hand, the cupolas, or furnaces, will be enabled to work continuously like a blast furnace, and, on the other hand, all the labor of renewing (every twelve hours) the long runners used in connection with the cupolas and ladles is entirely done away with.

In a cupola in which copper is melted, or in a foundry or metallurgical works, they are equally useful in saving labor and in increasing the capacity of the plant.

Claim 1. The combination, with a cupola as ordinarily constructed, of a water cooled breast block containing the sand breast, substantially as and for the purpose specified.

2. The combination, with a cupola as ordinarily constructed, of a cast iron runner, sufficiently thin to be cooled by the air, substantially as set forth.

3. The combination, with a cast iron runner, as described, of a cooling tube cast in the bottom of the same, substantially as and for the purpose specified.

Stack No. 2, of the Jackson Furnace, at Fayette, Michigan, recently went out of blast for want of coal, after having been in blast for 161 days, consuming in that time,

Coal	496,250	bushels.
Ore	15,551,450	pounds.
Limestone	534,755	"
Clay	162,950	"

The product of which was:

Pig iron		4,458
Castings		3 1757-2240
Total	4,461	1757-2240 gross tons.
Yield of ore	64	26-100 per cent.
Coal per ton of iron	111	02-100 bushels.
Iron per day	27	1600-2240 gross tons.

Furnace, nine foot bosh and forty feet high.

During the last year, ending May 1st, Ashland Furnace, using the Ashland smelting coal, was in blast 311½ days, stopping twelve hours on each Sunday. In that blast she made 12,620 tons of excellent iron, an average of about 40½ tons daily, on a hearth of Mt. Savage fire brick, which is now in its third year, and yet in excellent condition, something rather out the usual order. The smoke stack at the furnace, ninety feet high, which had been in an insecure condition for some time, fell on Sunday night the 11th., but without any serious damage resulting. It was to have been taken down the next day.

The Portsmouth Foundry and Machine Works (formerly Murray, Moore & Co.), since the advent of J. L. Kirk as manager, have been second to none in the Hanging Rock region for the promptness and efficiency with which they have turned out work. In the last two months they have turned out two furnace outfits and are now engaged on the engines for the Iron Hills furnace, in Carter county, Ky., for Mr. Smith's new stone coal furnace, in Jackson county, Ohio, and also for the new furnace being build in Missouri by a Portsmouth company, the name of which we do not recall.

The Belfast Iron Works, of Ironton, O., employ about 500 hands, and manufacture weekly about 4000 kegs of nails. Their make they own kegs as well as nails.

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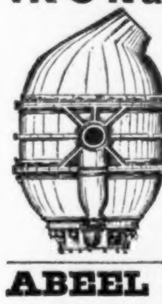

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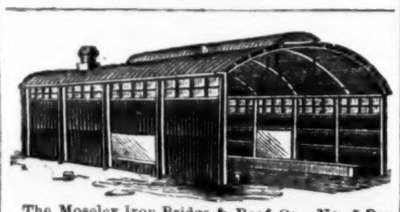

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Bridge Rods, Hexagon, Square, T and Button Head Bolts, Bolt Ends, Rivets, Car Wheels from best Cold Blast Charcoal Iron, Locomotive, Car, Engine and Bridge Castings, Chilled Rolls, Rolling Mill and Blast Furnace Castings.

On the Molecular Changes produced in Iron by variations of Temperature.

BY PROFESSOR R. H. THURSTON.

1. To determine with accuracy what are the molecular changes which are produced in iron by variations of temperature, and of other physical conditions, it should be first ascertained, by experiment and observation, what are the normal relations of the molecules, and, afterward, by similar means, in what way and to what extent, those relations may be naturally or artificially altered.

So much having been done, the investigation of the changes in the mechanical properties of iron, which result from these molecular changes, is a secondary research, and should naturally follow the preceding, as its sequel.

The almost insuperable difficulties which are encountered in attempting to deal with particles of seemingly infinitesimal dimensions, and with intermolecular spaces of immeasurably minute extent, have, as yet, prevented a satisfactory prosecution of the first part of the investigation by even the ablest physicist, and the second division of the subject still remains as a problem only partially solved, notwithstanding the fact that a considerable amount of experiment and discussion has thrown light upon it.

2. The following may be considered as a statement of the most generally accepted views of the molecular constitution of matter; views which are usually considered to most fully accord with observed phenomena.

(1.) All matter consists of indefinitely small parts, having dimensions and forms which are unchangeable by finite power, and which are endued with the properties of impenetrability and inertia.

(2.) These "atoms" are separated by spaces which are absolutely very small, but which are immensely great in comparison with the atoms themselves.

(3.) Several atoms, when united by chemical force, form a molecule, and aggregations of molecules, with intermolecular spaces, make up the masses of all matter.

(4.) Forces, both of attraction and repulsion, exist between atoms and molecules. These forces vary, in intensity, with changes of distance between molecules. The resultant of these sets of forces is sometimes attractive, and sometimes repulsive, changing at times, and under definite conditions, from the one direction to the other. There may thus be exhibited several alternations of attraction and repulsion within a very minute range.

(5.) At sensible and measurable distances the attractive force varies inversely as the square of the distance between the centers of attraction, and is termed gravitation.

(6.) Gases manifest repulsion only in a degree which, in "permanent," or perfect, gases, varies inversely as the volume of the mass.

Liquids exhibit a perfect equilibrium of attractive and repulsive forces, but offer immense resistance to the disturbance of that equilibrium, by effort to reduce their volume appreciably, and less, although still considerable, resistance to its disturbance by increase of volume.

Liquids, however, offer exceedingly slight, and sometimes immeasurably slight, resistance to change of relative position of their particles, which, therefore, move more or less freely among each other, according to the greater or less viscosity of the liquid. They thus offer little or no resistance to change of form.

Solids are composed of aggregated molecules existing in the same condition of equilibrium as is seen in liquids, and offering similar resistance to change of volume, but they differ from liquids in exhibiting resistance to change of form, which resistance can usually only be overcome by actual destruction of cohesive force. This peculiar condition is the result of that form of force which has been termed "polarity."

(7.) These three forms of matter are not distinctly separated from each other, but the same substance may pass, by gradual change, from one to another of the several classes, and may, in its ordinary state, exhibit such physical characteristics as to make it difficult to determine to which of two classes it is to be assigned.

In addition to the above it may be added:

(8.) Solid bodies offer a resistance to change of form, which, within narrow limits, is proportioned to the magnitude of that distortion.

Beyond these limits the force producing change of form soon separates the atoms completely, by overcoming gradually the interatomic forces, and rupture takes place.

3. The last principle was discovered two centuries ago by that wonderfully acute philosopher, Robert Hooke, who published in 1678 his now well known law, "*ut tensio sic vis.*"

The first seven of the preceding principles embody the general theory of Roger Joseph Boscovitch, who first published it in an important treatise printed at Vienna in 1759.

Both of these early philosophers based their theories upon such unsatisfactory experiments as they were able to observe before scientific methods had begun to exhibit the exactness and the delicacy now characterizing them.

It seems equally remarkable that their deductions should accord so perfectly with later determinations, and that so little progress should have been made since, in researches upon intermolecular relations.

That portion of the theory of Boscovitch which supposes several alternations of attractive and repellant forces, has received some apparent confirmation by experiment, but it is by no means proven. It would seem more probable that the attraction of cohesion, and the repulsive force of heat energy, are the two simple intermolecular forces which determine intermolecular distances.

Rankine's theory of molecular vortices affords a hint as to the possible action of heat here referred to.

4. It would seem very possible that phenomena apparently conflicting with this latter belief, will find explanation in molecular changes of position, rather than in the interaction of forces differing in nature, from those familiar to us.

In all familiar examples of solids the force of repulsion increases more rapidly than that of attraction as the molecules are forced to approach each other, and the reverse is observed as they separate. The molecules occupy, when undisturbed by external forces, positions of equilibrium which have been attained by passing over a range through which, at a constant temperature, attractive force has predominated, and the alternations referred to above, can, if observed at all, only be seen after compressing the mass and forcing the particles past this first position of equilibrium.

The other principles stated, if not absolutely proven by experiment, are at least rendered extremely probable, and are uncontradicted by any recorded phenomena.

Hooke's law has been proven sufficiently exact by numerous experimenters upon the tensile and compressible resistances of materials, and by Chevandier and Wertheim, and later, more fully, but not with more precision, by the writer, in a series of experiments upon torsional resistances, in which the apparatus was made self-registering.*

5. We remain at present in almost perfect ignorance of the true nature and exact relations of the forces which are concerned in determining these physical conditions of matter.

So much as is known is, apparently, in conflict with every hypothesis yet proposed, in some essential point, yet we cannot resist the conviction that these forces are simple modifications of those most familiar to us; the attractive force being that of cohesion, and the repellant force being that of heat motion, while a third force, or third component of the one force, is that known as "polarity."

It would seem, from the experiments of Coulomb, Professor Henry, Plateau, and others, that the elasticity and resistance of solids are due, principally, to the action of molecular forces during changes of molecular grouping, rather than to changes of distances between particles. The latter has an exceedingly slight range, but, as shown by those experiments of Wertheim, which indicate an alteration of volume by tensile stress, an actual, though slight, change of atomic distances does probably take place.

It cannot be asserted that these experiments are absolutely conclusive on this point.

6. The experiments of Prof. Baden Powell upon the effect of heat in altering the breadth and diameter of Newton's rings,† are strongly confirmatory of the opinion, already expressed, that the repulsive force of the intermolecular spaces is that of heat motion.

7. The experiments of Dr. Andrews upon the "critical state" of substances passing from the liquid to the gaseous condition, and *vice versa*, are considered, by him, to indicate that those states are "but widely separated forms of the same conditions of matter," and that the one may be made to pass into the other without abrupt change.‡

M. Cagniard de la Tour made the earliest experiments in this field in 1822, and was closely followed by Faraday.

Dr. Andrews' more recent researches are probably the most complete and the most fruitful. His investigations of the phenomena accompanying the changes of carbonic acid, as to temperature and pressure, and, particularly, while passing through that phase of transition known as the "critical state," have thrown some light upon molecular relations.

The "critical state" is that condition of matter in which it exists when just passing from the liquid to the gaseous state, or the reverse, by a regular, as distinguished from the more familiar, irregular process. It constitutes the "debateable ground" between these two states of matter, whence it is impossible to determine in which condition it should properly be considered.

It is found that, when just approaching this point, liquids are even more compressible than in the antecedent gaseous condition.

Water passes through the critical state at a temperature estimated at about 770° Fahr. by M. Cagniard de la Tour, and at a pressure too high to be accurately measurable.

At this high temperature and pressure it dissolved the glass tubes in which it was attempted to confine it.

8. Dr. Andrews found that carbonic acid exhibited this gradual and regular change from the gaseous to the liquid condition at a much lower temperature.

The experiments of M. Tresca on the "flow of solids"‖ are exceedingly interesting and valuable in this connection, as lending confirmation to the views expressed by Dr. Andrews.

The phenomena of the critical state are considered by high authorities as strongly confirmatory of that portion of the Boscovitch theory which most requires confirmation.

9. After having passed from the gaseous to the liquid state, matter is found exceedingly difficult to reduce in volume. A pressure of one atmosphere produces, in the case of water, a decrease of volume of but *forty-six one millionths.*§

10. In liquids, attractive force makes itself observable, although the extreme mobility of their particles prevents the ready or accurate measurement of its value.

Professor Henry, who made the first attempt to estimate it, considers that the cohesive force of water is several hundred pounds per square inch. This considerable force resists change of distance between molecules, but does not perceptibly influence change of form, and we have, therefore, the curious fact to observe, here, of the co-existence of high cohesive force with almost perfect mobility of particles; the latter condition rendering the resistance to change of form very difficult of detection and measurement.

11. In the process of transition from the liquid to the solid state, in addition to the generally continued diminution of volume, molecular approximation, and the assumption of new positions of equilibrium by the particles, in consequence of the abstraction of heat, another, as yet unexplained, action occurs, which may be called, for want of a better term, *molecular polarization.*

This new force comes into play at a point which is definitely fixed, for each substance, on the scale of temperature, and although the resistance to forces tending to produce changes of intermolecular distances may be but little increased, resistance to change of form makes itself observable, generally suddenly, and solidification is produced by the fixation of molecules in definite relative positions.

The characteristic which distinguishes the solid from the liquid state is the effect, apparently, of this force of "*polarity*," simply.

Dr. Henry remarks "It is in accordance with the phenomena of cohesion to suppose that when a solid is liquefied by increase of temperature, instead of the attraction of the liquid being neutralized by the heat, that the effect of this agent is merely to neutralize the polarity of the molecules, so as to give them perfect freedom of motion around every imaginable axis." This author was probably the earliest to detect, and to state thus precisely, the part played by this force of polarity in molecular phenomena.

[To be continued.]

* Journal Franklin Institute, April, 1873.
† Phil. Trans., 1834. ‡ Phil. Trans., 1869.
‖ London *Engineering*, 1866–'67.
§ John Canton, Trans. Royal Soc., 1762.

The Detroit Novelty Works were organized in March, 1869, for the manufacture of all kinds of brass goods and machine knives. So great has been the increase of their business that they have found it necessary to greatly increase their facilities. Their works are now located on Mt. Elliot Avenue, on the north and south corners of Wight street. Their buildings cover a frontage of 320 feet, being 200 feet south of Wight street, and 120 feet north of Wight street. Their present business consists in steam heaters for public or private buildings, filling orders for gas or water pipe, cut and fitted as ordered, all kinds of gray iron castings, brass castings, and brass goods of all kinds, also machines knives and tobacco knives, and any steel forging as ordered. The machine shop for pipe work is 40x100 feet, two story brick, with a complete outfit of the best machinery. The first molding room for iron castings is 64x78 feet; the second molding room is 45x100 feet. Here all kinds of iron castings are turned out to order. The brass foundry and finishing shop is 40x120 feet. The steel department contains a blacksmith-shop with seven fires; a grinding room with five large stones, polishing and tempering rooms, package and storage rooms. The forge contains three steam hammers. This department is making a specialty of machine knives and tobacco knives, and its market runs throughout all this portion of the Union, extending as far east as the city of New York On the north of Wight street, fronting Mt. Elliot avenue, are located the company's warehouses, in which are stored steel and iron goods, patterns, machinery, iron and coal. The company also own a two-story brick building on the corner of Brush and Woodbridge streets, which they use as their central place of business, consisting of a store, warehouse and general office. The company employ from 60 to 75 men. Their annual pay roll amounts to about $50,000; use about $100,000 of wrought iron pipe. Their present business is about $200,000 per annum, and rapidly increasing. The company have a paid up capital of $100,000, with a handsome surplus.

One of the most interesting examples of the manner in which manifold and complex mechanism is now made to do the work of human fingers, is that by which envelopes are now produced by means of machinery recently introduced in England. A pile of envelope blanks is placed on a plate on the left-hand side of the machine, this being done either when at rest or when in motion. A hollow brass tube, with an end of a peculiar shape, decends upon the envelope blanks at the side nearest to the folding-box. To the other end of the tube is attached an India-rubber pipe communicating with an air-pump which, coming into action at this instant, causes the blank which is upon the top of the pile to attach itself to the brass tube, which, rising, carries the envelope blank with it. A pair of grippers then run forward, and, seizing the blank, carry it into its proper position over the folding-box; after which it is stamped, and the gum applied in the proper places upon the two side-flaps—this movement being singularly ingenious. At this point, a plunger descends and carries the blank into the folding-box; upon the plunger rising, slides working in the thickness of the folding-box run in and inclose the flaps in their proper order. The bottom of the box now rises and completes the operation by pressing the envelopes against the slides; the bottom of the box then falls and allows the envelope to drop in an upright position into a trough running under the machine, when it is met by a simple contrivance, which secures the envelope with its flaps in proper position in the trough, and, as each successive envelope is placed in front of it, it gradually works along the through until removed by the attendant and banded.

The Nichols Wrought Iron Furnace, for warming buildings, was invented by Dr. James R. Nichols, editor of the Boston *Journal of Chemistry*. These furnaces are manufactured by Le Bosquet Brothers, Haverhill.

Two lighthouse lanterns for Lake Superior, and two for Lake Michigan, are being constructed by the Ames Company, of Chicopee.

The Metallurgical Features of the Vienna Exposition.

[Special Correspondence of *The Iron Age.*]
[Continued.]

VIENNA, Austria, May 10, 1873.

Perhaps the most interesting thing in the whole German exhibition are comparative charts of the productions of England, France, Austria and Germany in stone and brown coals and pig iron. The statistics of North America, not extending further back than 1868, that country has not been included in the lists. The tables have been prepared by the government of Prussia, at an immense expense of time and labor. They are not yet published, and cannot fail to be interesting to the readers of *The Iron Age.* We regret exceedingly the absence of North America from the charts, since from the late enormous development of our coal and iron interests, we feel confident that our country would bear a fair comparison with the others. The yield is given in round numbers, and extends from 1867 to 1870. The figures show a steady increase in the amount of the different materials. The yield during the last two years has decreased, owing, doubtless, to the late war. The numbers are given in *millions of kilogrammes.*

	1867.	1868.	1869.	1870.
PIG IRON.				
England	4,550	5,090	5,500	6,100
German Confederation, including Prussia	1,125	1,250	1,400	1,320
France	1,060	1,150	1,300	1,290
Prussia (alone)	900	1,090	1,100	1,150
BROWN COAL.				
German Confederation, including Prussia	6,900	7,200	7,570	7,600
Prussia (alone)	5,500	5,600	6,000	6,100
Austria	2,750	3,500	3,700	4,500
STONE COAL.				
England	106,090	106,490	109,000	112,500
German Confederation, including Prussia	24,000	26,100	27,000	26,500
Prussia	21,000	25,000	24,000	24,500
France	12,000	12,500	12,600	11,000
Austria	8,000	9,000	9,070	9,100

The above shows that, excepting North America, England leads the world in the production of pig iron and stone coal, and the German Confederation, including Prussia, in that of brown coal. England produces, on an average, about from 4½ to 5 times as much pig iron annually as the entire German Confederation, while in stone coal the proportion is nearly the same. It is interesting in studying the charts, which extend from 1837 to 1872, to note the effects of the various wars that have occurred, the production being always considerably reduced.

Beside these comparative charts are others containing statements of the production of Prussia between the years 1837 and 1872. To show the enormous development of this country, I will annex the total production of the two earliest with the two latest years. The amount of steel produced by Prussia in 1837 and 1838 was about the same for each year, viz.: about 5,000,000 kilogrammes, while in 1871 and 1872, the yield had increased to 160,000,000 kilogrammes for each of these years. The yield of brown coal in 1837 was 400,000,000 kilogrammes; in 1838 460,000,000 kilogrammes. In 1870, it had increased to the enormous amount of 6,150,000,000 kilogrammes, and in 1871 to 6,870,000,000 kilogrammes.

Stone Coal—Yield in 1837 and 1838 about the same, viz.: a little over 2,000,000,000 kilogrammes each year, while in 1870 it had increased to 24,500,000,000 kilogrammes, and in 1871 to nearly 26,000,000,000.

Cast Iron—Yield in 1837 and 1838, the same, each year, about 10,000,000 kilogrammes. In 1870 it had increased to 1,150,000,000 kilogrammes, and in 1871 to nearly 1,200,000,000 kilogrammes.

From careful estimates made by the government, the value of the Prussian metallurgical products has been placed as follows:

Stone Coal—For 1837 and 1838, 7,000,000 marks each year; 1870, 202,000,000 marks; 1871, 258,000,000 marks.

Brown Coal—1837 and 1838, 5,000,000 marks each year; 1870, 67,000,000 marks; 1871, 73,000,000 marks.

Iron Ore—1837 and 1838, 4,000,000 marks each year; 1870, 49,000,000 marks; 1871, 53,000,000 marks.

Zinc—1837 and 1838, 3,000,000 marks each year; 1870 and 1871, about 30,000,000 marks each year.

The remaining products, in the order of their money value, are as follows: Lead and silver leads; copper ores; and then those of cobalt, nickel, manganese, arsenic, etc.

The above statistics disclose the following important facts, viz.: that the most valuable of the metallurgical products of Prussia is found in her yield of stone coal, and then, in the order of their money-value, come brown coal, iron ore, zinc, cobalt, nickel, manganese, &c., &c. It will also be noticed that the production of zinc does not fall far below that of iron, so far as the marketable value is concerned. The Prussian coal fields appear to be about six times more valuable than her beds of iron ore, and nearly three times more valuable than those of iron and zinc ores together. The yield in bar iron has increased from 65,000,000 marks in 1837 to 825,000,000 marks in 1871.

In front of the eastern entrance to the building we have been describing, stands a large monument formed of specimens of coal, in immense blocks, from the various mines of Upper Silesia. On various pedestals placed on the monument stand artistic figures beautifully cast in zinc, from the mines of Prince Hugo of Hohenlohe. The casting was done at the foundry of A. Castnce, Berlin. Among the many figures which adorn the monument we notice, especially, cupid, as a mechanic, and another cupid with an anchor. Each specimen of coal is marked in gilt letters with the name of the mines from which it was obtained. The rough blocks of coal are really artistically grouped, and the clean zinc figures, together with the gilt lettering, combine to produce a very striking effect. A monument of the same size and somewhat similar construction, but composed entirely of specimens of iron and other ores, is now being erected near by.

In that portion of the building immediately adjoining the western entrance are exhibited specimens of the ores of various parts of Germany. In the middle of this wing of the building stands a four-sided pyramid, furnished with shelves from the top to the bottom. On these shelves are exhibited cubes of ores and metals, showing the proportionate yield of the mines. Each side is devoted to the display of the yield of one of the most productive mines in the district. The four sides are occupied respectively by the mines of Freiburg, Upper Silesia; Mansfeld, Prussian Saxony; Friedrichshutte, at Tarnowitz; and Clausthal, in the Harz Mountains. Starting from the bottom shelf of the pyramid we find a large cube of ore, representing the entire annual yield, expressed in centners, or cwt. Then, in shelves successively above, we find proportionally smaller cubes, representing the quantity of various metals that have been obtained from the amount of ore represented below. I will annex the principal of these figures:

FREIBERG, UPPER SILESIA.

	Centners.		Centners.
Gold	1	Bleistein	73,300
Silver	620	Zinc	4,900
Sulphate of Copper	31,000	Copper Ore	47,000
Bismuth	64	Lead Ore	167,000
Soft Lead	77,500	Arsenic Ore	40,300
Antimony Lead	2,470	Zinc Ore	17,500
Werkblei, *i. e.*, lead used in separating silver	90,000	Ore	3,560,000

MANSFELD, PRUSSIAN SAXONY.

	Centners.		Centners.
Silver	450	Sulphuric Acid	105,900
Copper	100,000	Ore	4,386,050
Slag	3,837,750		

FRIEDRICHSHUTTE, TARNOWITZ.

	Centners.		Centners.
Silver	122	Washed Ore	100,300
Lead used in separating silver	136,657	Lead Ores	93,000
Lead	115,300	Ore	242,300

CLAUSTHAL, HARTZ MOUNTAINS.

	Centners.		Centners.
Gold	·4	Werkblei	20,900·
Silver	343·	Sulphuric Acid	8,340·
Refined Copper	1,180·	Arsenic Ore	75·
Sulphate of Copper	9,960·	Copper Ores	7,800·
Hard Lead	3,590·	Silver Ores	12,680·
Soft Lead	153,500·	Vitreous Silver Ore	265,540·
Ordinary Black Copper Ore	1,240·	Zinc Blende	83,900·
Black Copp'r Ore	1,530·	Ore	2,990,500·

I have not given the entire production of any of these mines. In all of them the whole quantity of ore extracted is accounted for, either in the valuable or refuse products. I have simply annexed such substances as would show the comparative values, both of the mines themselves and the ores they yield respectively.

From the district of the Middle or Prussian Rhine are exhibited specimens of the ores and finished products of the district. Among the ores we notice brown and red hematites, specimens of immense geodes of hematite and lead ores.

From the iron works of the Maximilian mine, at Regensburg, is exhibited an artistically arranged group of iron ores; also railroad iron, with sections showing breaking proofs; rods, bars and sheet iron.

The Brothers Kramer, of St. Ingbest, exhibit steel and copper wire.

From the Konigliche Sachsmithe Copper Works, immense specimens of hammered copper ware.

The Zwitterstocks Factory, of Altenburg, Saxony, exhibit specimens of metallic zinc, from their works.

The largest specimens of worked iron on exhibition in this section of the German department are immense iron beams from the Luxemburg Iron Works and the Saarbruck mines. The dimensions are as follows: length, 57 feet; depth, 14 inches; cross section that of the letter I. Not satisfied with sending a single specimen of these immense beams to the Exposition, the company exhibit no less than 26 of them of the same length, but of different depths, and cross sections.

The Brothers Stumm, of Saarbruck, exhibit railroad and bar iron, zinc plate, corrugated zinc and iron plate, and a large single iron band 17·48 metres in length.

The Dillingen mines and works, of Dillingen, at Saar, exhibit immense iron plates; a bridge plate of 2100 lbs. weight, 15 metres long, 10 broad, and 9 m. m. thick; a reservoir plate weighing 1065 kilogrammes, 6½ metres long, 1·9 metres broad, and 11 m. m. thick.

In my next letter I will give you some account of Krupp's manufactory, the German Exhibition of Westphalia and Aix la Chapelle, the iron and metallic products of Belgium and Sweden, and other features of the Exhibition.

A difficulty is often experienced in causing oil colors to adhere to sheet zinc. Boettger recommends the employment of a mordant, so to speak, of the following composition: one part of chloride of copper, one nitrate of copper and one of sal-ammoniac are to be dissolved in sixty-four parts of water; to which solution is to be added one part of commercial hydrochloric acid. The sheets of zinc are to be brushed over with this liquid, which gives them a deep black color; in the course of from twelve to twenty-four hours they become dry, and to their now dirty gray surface a coat of any oil color will firmly adhere. Some sheets of zinc prepared in this way, and afterward painted, have been found to entirely withstand all the atmospheric changes of winter and summer.

A mechanic in Philadelphia proposes to build steamships of one solid piece of iron or steel, without seam of joint. This he accomplishes by welding the plates and frame, instead of using bolts or rivets. He claims that he has invented machinery by which the thing can be done, at a great saving of cost, of weight and of time, and with a great gain of strength and durability.

One of the queer features of the English coal statistics is the statement that an additional ton of coal has to be mined each year for every person added to the population.

THE NICHOLSON FILE.

All Nicholson Files are cut with the Patent *Increment Cut,* an invention owned and controled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly *expanding or increasing in size and space from the point,* thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will *not* be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of Increment Cut File, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "*Increment File*" is not an experiment, but an established fact, and already has acquired a legitimate demand for upwards of 500 dozen per day. We employ no *regular Travelers,* but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

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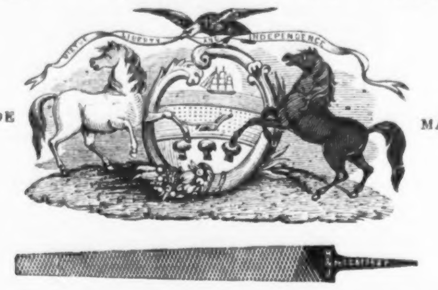

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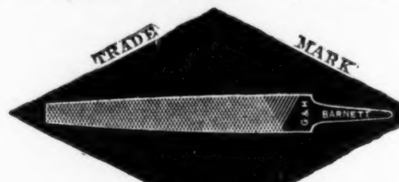

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Grobet Swiss Files,
Extra Quality English Spring Steel Wire,
Nos. 1 to 34.
Steel Wire for Sewing Machine Needles and for other Purposes,
French Cold Rolled Sheet Steel,
Sizes, 22 to 36 Gauge.
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For Hatters' and Machinists' Use.

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Malleable Iron Castings, from **AIR FURNACE** or **Cupola,** furnished to order.
Small Gray Iron Castings, soft and smooth.
Brass Moulders' Flasks, Cabinet and Coach Makers' Clamps
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HORSE SHOE NAILS.
Manufactured from the best of **NORWAY** Iron, and warranted to give entire satisfaction.
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UNITED NICKEL CO. OF NEW YORK.
Premium Awarded by the N. J. State Fair,
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Butchers' Cleavers,	Axes and Hatchets,
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Turpentine Tools, all kinds,	Mill Picks, Mattocks & Picks
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No. 614 & 616 Market Street, **PHILADELPHIA.**
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William Penn, Reading and Norristown Pig Iron.
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For Trimming Dwelling Houses, Stores and Public Buildings, consisting of
Butts, Door Knobs, Locks, Bolts, Store Door Handles, &c.
ALSO, A FULL LINE OF
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E. C. MERRILL, West Charleston, Vt.
Patentee and Manufacturer of the **Cosmopolitan Solid Emery Wheels. Saw Gummers, Artificial Stone** for Building and Ornamental Purposes, **Diamond Turning Tools, Emery Wheel Machinery, &c.**

OFFICES. { **Boston, 114 & 116 Elliot Street. New York, 91 Liberty St.** } **R. R. Wheeler,** Agent

A complete assortment of sizes, grades, &c., constantly on hand. The **Cosmopolitan Emery Wheels** have taken the Highest Awards at every Fair where they have been exhibited, viz.: N. Y. Institute, 1872; New England Agricultural and Mechanical Fairs, held at Lowell, Mass., and the Vermont State Fairs for the past two years. Send for Prices. A liberal discount made to the trade.

Something New for
OTIS FURNACES & MINES.
New Union Steam Safety Elevator,
How One Works.

RIVERSIDE IRON WORKS, DEWEY, VANCE & CO.,
Wheeling, W. Va., January 14th, 1873.

Messrs. OTIS BROTHERS & CO., New York.

Dear Sirs: The experience of a year proves that ***your Furnace Elevator is superior to all others in use.*** We have in the six weeks from December 1st to Sunday last, 12th inst., made ***9724 tons, 1401 lbs. Pig Metal,*** or an average of near ***65 tons per day,*** which required the elevator to ***lift 72 feet high*** 4¼ tons Ore, Coke and Limestone for each ton of metal produced, or ***more than 11,500 tons material in the 6 weeks.*** The largest yield in ***one*** day was ***81 1-4 tons*** Iron, involving the lifting of ***345 tons*** material ***in 24 hours.*** This has all been done to ***our satisfaction,*** and that, too, in the ***coldest weather we have had.*** Other furnaces with ***water*** and ***pneumatic hoists*** have experienced ***great difficulty,*** on account of the ***water freezing*** in the ***tanks;*** and in the case of the ***air*** hoists, we understand that two furnaces, not far from us, ***had*** to ***"blow out,"*** from being ***unable to hoist stock*** during the ***"cold snap."*** The difficulty, we are told, was caused by the ***condensed moisture*** in the ***blast freezing to the sides of the cylinders,*** so that the ***piston could not move*** up or down.

Very truly, yours, DEWEY, VANCE & CO.

Send for Circular to
OTIS BROTHERS & CO.,
348 Broadway, NEW YORK.

BUSINESS ITEMS.

NEW YORK.

The Central Railroad repair works, at Niagara Falls, were burned May 19th, resulting in the loss of $100,000. About 150 employees are thrown out of employment.

The Clinton Iron Company, a newly formed corporation, have begun the building of a blast furnace in the village of Kirkland, eight miles from Utica. The officers of the company are: president, Thos. W. Dwight; vice president, Sidney A. Bunce; secretary and treasurer, Theo. Avery; superintendent, B. S. Platt. Iron ore and limestone are abundant in the vicinity of this furnace.

PENNSYLVANIA.

Seventy-five new engines have been ordered at the Pennsylvania railroad shops at Altoona, for the use of the road. They are to be finished by the close of the year 1873. That road now has, it is said, 811 locomotives running.

Messrs. J. Crawford & Co. have secured the buildings formerly occupied by the Graff Axe-Works, in Allegheny, and fitted them up for a foundry, to be used in connection with their malleable iron works.

The Pennsylvania Steel Works, at Harrisburg, have contracted to furnish 250 tons of steel rails for the Catasauqua and Fogelsville Railroad, 95 tons of which have been delivered.

A company of Easton capitalists has been formed with the object of building a rolling mill along the Lehigh and Susquehanna Railroad, in Palmer township, Northampton county.

The erection of a new foundry has been commenced at Weissport, to be called "Fort Allen Foundry." Messrs. William and Douglass Miner are the proprietors. The building will be 40x70 feet.

Mr. William Firmstone, superintendent of the Glendon Iron Company's Works, proposes to erect a large nail factory near Glendon.

The Kemble furnaces, at Riddlesburg, on the Huntingdon and Bedford Railroad, are turning out 310 tons of pig metal per week.

The following figures show the iron tonnage building or built during 1872 at Messrs. Cramp & Son's, Kensington: The amount of iron tonnage built in 1872 was 10,800 tons; the amount of iron tonnage commenced building in 1872 was 14,000 tons; approximate consumption of plate and other iron used in this work was about 7750 tons.

The Girard Tube Works, of Philadelphia, have increased their facilities to such an extent that they are able to turn out wrought iron gas pipe at the rate of eighty thousand feet for the twenty-four hours, or equal to about fifteen miles.

MASSACHUSETTS.

The Emery Wheel Manufacturing Company, of Leeds, contemplate a removal of their business to Florence.

Hale & Co., of North Dana, are rapidly rebuilding their works, recently destroyed by fire. Several new buildings have already been completed. Their engine and boiler are in working order, and the injury to the dam has been repaired. New machinery and belting have been procured and set up, and work has begun.

The Holyoke Steam Boiler Works, of which Coghlan & Mullin are proprietors, are about to have a large addition made to them.

The Wason Car Company, of Springfield, has just shipped eight passenger and four baggage cars for the Canada Southern Railroad, being the first of a large order. They are painted olive without, finished in rosewood and bird's-eye maple within, furnished with Baker's heating apparatus, Westinghouse brakes, and Miller platform. The cost of the trains is about $75,000.

The Ames' Works are manufacturing two Boyden turbine wheels, of 250 horse-power each, for William D. Washburne's new and extensive planing mills at Minneapolis, Minn.

A great variety of wood-working machinery is manufactured by Richardson, Meriam & Co., of Worcester. They are now building a Daniels planer for parties in Milwaukee, 115 feet long, calculated to plane stock sixty feet long and four feet wide. They have recently sent two planers to the San Francisco navy yard, one 135 feet long, to plane stock seventy feet long and three and a half feet wide, and another to plane stock twenty feet long and seven feet wide. They employ eighty-five hands, and steam furnishes the power to run the machinery. The goods find a market in the United States, England, South America, Australia, Canada, and Cuba. A large order from Brazil has recently been filled, and they are at present engaged upon other foreign orders.

O. Phillips, of Lynn, manufactures 300 different kinds of sewing machine needles, and can turn out 10,000 per week. He has been in the business twenty years and employs eight to ten hands.

NEW JERSEY.

The Paterson *Press* says: An organization called the New Jersey Iron Company, formed for the purpose of operating, mining, smelting, manufacturing and rolling iron and other ores and metals, has just procured a charter in Virginia and will locate their principal office in Richmond, the capital of the State. The real estate to be held by the company is not to exceed 40,000 acres, and the capital stock is to be not less than $50,000 nor more than $300,000. The officers and directors are principally Jersey men, Ex-Gov. Theo. F. Randolph being the president.

Boonton encourages the establishment of manufactories there by exempting them from all municipal tax for five years.

Rapid progress is being made in the construction of the blast furnace at Franklin, and work has been commenced on the engine house.

The Cumberland Nail and Iron Company, of Bridgeton, employs four hundred and fifty hands, and pays the large sum of $22,000 cash to them monthly.

VERMONT.

The Fairbanks Scale Works, St. Johnsbury, have received a $30,000 order from the Russian government, for scales to be used in custom houses and on railroads.

The work of rerolling old rails has begun in the new rolling mills at St. Albans. There are about 150 men now employed under the superintendence of A. H. Brainerd. The puddling furnaces are not quite ready yet. When the works are in full operation they will employ about 400 men.

CONNECTICUT.

The Miller Brothers' cutlery works, at Meriden, are being enlarged.

A new manufacturing company, with a capital of $50,000, has been formed in Norwalk under the name of "The New England Motor and Mower Company." It will make water motors, steam engines, and mowing machines. A. H. Byington is president.

The Southington Eyelet Company are putting up a new factory, 30x80 feet, which they will occupy next month.

The Barnum Richardson Car Works, at Lime Rock, are casting on an average 80 car wheels a day.

OHIO.

Lambert & Gordon, Ironton, are building a fifteen horse-power engine for the Oakdale Furnace, near Chattanooga, Tennessee, to be used for hoisting purposes; one engine of about sixty horse power, with the cylinder twelve inches in diameter and twenty inch stroke for the Norton Iron Works; two hot blasts for the Belfont furnace, and one for Etna furnace.

A new water wheel company has been formed in Dayton, under the name and style of Herrmann & Herchelrode Manufacturing Co., for the purposes of manufacturing the improved Thomas Leffel turbine water wheel. The above named company have abundant capital, and have fitted up their works with the best modern machinery, made by the Niles Tool Works of Hamilton, and are turning out superior wheels.

Griffith & Wedge, of Zanesville, finished a few days since a very fine engine for a flouring firm in Lancaster, Dallas county, Texas.

Long & Allstatter, of Hamilton, are building new works to accommodate their increasing business. The main building is to be 204x144, three stories; the foundry 123x50; pattern room 60x40 feet. They expect to move into their new quarters 1st of October.

Cope & Maxwell Manufacturing Company, manufacturers of pumps, of Hamilton, are building a pump for the Newport Water Works, of Newport, Ky., calculated to deliver one million gallons of water per day to the reservoir at a hight of 360 feet. Their works are making a specialty of building pumps for water works.

Two new furnaces are being built in Jackson town, Lawrence county, and a third will be built where coal was found.

The capital stock of the Charcoal Iron Company, owning Howard and Bucknorn furnaces, Lawrence county, has been increased from $150,000 to $300,000.

Holabird & Co., of Cincinnati, well known builders of superior circular saw mills, grist mills, engines, and heavy machinery, are looking for a favorable location to remove their works West or Southwest to more readily accommodate their trade.

Bate & Son, boiler makers and machinists, in Conshohocken, are putting up a foundry for machine casting, adjoining their shops. The building is forty by sixty feet. The same firm has taken out a patent for a new combined heater and filter, bearing the date of April 15th.

MISSOURI.

The St. Louis Bolt and Iron Company now have their rolling mill at East St. Louis in full operation, employing eighty hands, and turning out thirteen tons of finished iron daily. Their new mill is 160x110 feet, with two double puddling furnaces, one scrap furnace, one bar mill furnace, one small mill furnace, one 16-inch train (bar and muck combined) and an 18-inch guide train. In addition to merchant bar, they make fish bars, bolts, spikes, rivets, lag screws, &c. They use Carondelet, Big Muddy, and Wisconsin iron. T. A. Meysenburg is president; Hugh L. Fox, treasurer; and William E. Guy, secretary.

The Salem Iron Company is now working about fifty men, and getting out iron ore rapidly. The company has a capital of $300,000, and is owned by the following named gentlemen: Wm. Spear, Jos. P. Card, Wm. I. Lewis and Benj. W. Lewis, of St. Louis, and A. B. Meeker, of Chicago.

The mills of A. McDonald & Co., at St. Louis, turn out from forty to sixty car axles per day, beside locomotive crank pins and other forgings. About sixty men are employed.

The Fort Scott Foundry and Machine Shop, at Fort Scott, manufacture engines, iron fronts for buildings, force pumps, mill gearings, &c. Forty-five men are employed, and the entire buildings nearly cover a lot 200x300 feet, and a further enlargement of buildings will soon be necessary.

The new machine shops of the A. & P. Railroad, at Sedalia, are rapidly approaching completion, and these, as well as the new round-house at Chamois, will be occupied in a few days.

INDIANA.

The Bass Car Wheel Works, J. H. Bass, proprietor, Fort Wayne, consists of a machine shop 50 x130, two-stories; a foundry 150x65; foundry 400x60; wood working shop 100x50, two stories; boiler shop 140x40—all brick. The capacity of the car wheel shop is 200 wheels per day, the melting capacity of the works being 100 tons per day. The annual sales now amount to $1,800,000, extend over a very wide extent of country, and the circle is constantly increasing. Over 40 railways are now supplied with wheels by this establishment, and the Fort Wayne car shops are supplied with general casting from this shop. It affords employment for 350 hands,

Cutlery.

Cutlery.

A Model Hardware Establishment—Pratt & Co., Buffalo, N. Y.

A visit to the hardware and iron establishment of the Messrs. Pratt & Co. would prove interesting and profitable to those who have not already been through this well regulated and extensive concern. The stores, warehouses and offices of Pratt & Co. are located on Terrace Square, in the city of Buffalo, N. Y., and embrace two large 5-story buildings running back 160 feet to the Erie Canal. Another building, of the same size, adjoins these, and is occupied by Messrs. Pratt & Letchworth, in the malleable iron and saddlery business. Beyond are the yards and sheds of Pratt & Co. for the storage of scrap iron, contractors' supplies, and a variety of bulky articles in their line. The total frontage of all on Terrace Square is 214 feet.

The situation of these buildings is convenient for general trade from the manufacturers of the city, who are chiefly found along the Buffalo river, and contiguous to these premises. Superior facilities also exist for the shipment of goods. Entering the central and largest building, we come at once into the

RETAIL DEPARTMENT,

devoted to the sale of general hardware. This room is about 100 feet deep and 30 feet wide, and is fitted with cherry shelving, counters and cases. The shelves contain more than 2000 boxes of various sizes, all painted a handsome green, and varnished. On the face of each box we observe a sample representing the goods or article within, arranged for handling and selling with the least possible delay. On the counters are glass cases containing finer goods. In front and on our left are large and elegant cases, reaching from floor to ceiling, used for the display of silver plated ware, of which the company sell large quantities. The counters and sideboards are filled with cupboards and drawers, in which every variety of goods in the hardware line is stored. Here is found a most complete assortment of builders' hardware and house trimmings of every possible description, to suit the tastes and requirements of all. The expression is general in Buffalo, "One may get anything at Pratt's." Twelve experienced salesmen are constantly employed in this department in attending to the wants of their numerous customers. P. & Co. have an extensive and increasing retail trade, and have, for many years, supplied the citizens with necessary articles for building. Probably every structure erected in the past forty years in the city has drawn some of its material from this concern. Passing to the rear we enter the

MAIN OFFICES,

which occupy several large rooms, and are fitted up with taste and elegance. The walls and ceilings are frescoed, and the floors partly laid with alternate ash and walnut. These rooms are furnished with large reflectors overhead, and can be brilliantly illuminated when desired. First, on the left, comes the cashier's office for the retail rooms, and the collection department; then the business office of the firm. On the right we find toilet rooms and offices for private consultation. In the rear and center a large and commodious space is occupied by the general cashier of the firm and by the telegraph department, separated from without by plate glass partitions. Passing on to the left through folding iron doors, we reach the elegant private offices of the firm on the right, and on the left the office of Messrs. Hall & Sons' Fire Brick Works. Beyond we notice a line of high desks, at which a number of young men are engaged in making invoices. Passing thence into the main book-keeper's department, we enter a large room, the whole side of which presents to one view an immense library filled with hundreds of books which have been used during the past forty years. Everything done in writing is here filed, many of the books having been rebound after use and conveniently placed for reference. All letter orders, all accounts, all matters of import, great and small, and all transactions of the firm through four decades, are here arranged so systematically that an easy reference to any can be made in a moment. The most minute items of business, every scrap of information regarding the vast business of the company, is here centralized in convenient shape.

THE LETTER ORDER DEPARTMENT

is located here. Pratt & Co. keep a number of agents constantly in the field, and this department of their trade has assumed large proportions. The Purchasing Department is back of this room, and here we find men constantly employed in buying and ordering goods for every branch of the trade, and who see to the replenishing of stocks daily.

A large safe, in which a dozen men may congregate, contains the books and valuable documents of the firm. This is fire-proof. Each department and the entire buildings are protected by iron shutters and doors.

Retracing our steps, we pass from the office entrance up an iron stairway to admirably arranged

SAMPLE ROOMS,

devoted to the display of hardware for the jobbing trade. Here customers may see at a glance and select their stock at pleasure from a multitude of samples, representing all branches of the trade. These sample rooms are over the offices—and in front over the retail room we have a room one hundred by thirty feet, for the

WHOLESALE HEADQUARTERS.

Here upon either side we see stocks of cutlery, both domestic and foreign, as well as finer goods in great variety. On the left, cupboard, till and chest locks, fine tools, etc., etc., and upon the right, files of all kinds, in which an extensive trade is done—the files being made, for the most part, in Buffalo. The center of this room is occupied by other sample-counters, the front by desks and conveniences for the wholesale clerks and the accommodation of customers.

Again ascending, we pass through several stories, each used exclusively for the storing of hardware, each room consisting of an entire floor, shelved and arranged for the safe keeping of goods.

Finally reaching the roof, we turn to the left and enter the second building; thence down again through successive stories, all packed with goods necessary to the trade; and as we go we notice shovels, forks, hoes, rakes and farmer's tools enough to stock a whole country, one would think. Tools for mechanics of every occupation, and supplies for contractors, builders, railroads and manufactories are present in great variety. Landing on the second floor we find ourselves in the packing rooms, where men are packing the goods for immediate shipment. Long counters, piled with goods "ready to pack," are seen on every side, and here, also, are stored quantities of screws, saws, planes, hinges, &c. Finding our way with some difficulty among the boxes and packages, we reach the stairway and descend to the story below. We are now on a level with the retail department, and in a large room used for the display of heavy and bulky articles, as saws, scales, blacksmith's material &c.

Arriving at the rear of the room we observe racks on which are arranged the retail stock of shovels, rakes, &c. Piles of wagon axles, chopping axes, mill saws, wire or brass, copper and iron, metals &c., come in our way. The sides of the room are cut into bins for machine bolts, coach screws, cold cut and hot cut nuts and washers, &c. In front are the shipping offices through which all goods received and sold must pass. One more descent and we are in the

IRON DEPARTMENT.

The basements running under the whole line of buildings are devoted to storing iron and heavy goods. Long alleys, like miniature streets, separated by solid stone walls, run through from the canal to the sidewalks on the terrace. Immense quantities of iron here stand upon both sides of the alleys, so arranged as to be handled with dispatch and convenience. This department is on a level with the berme-bank of the Erie canal, and is connected with the stores above by several stairways. A drive entrance for teams leads to the terrace, and also one to the same street through the yards.

In the center is a large open space, where we notice teams loading and unloading iron, nails, etc., while there is ample room for many more throughout the cellar. All is bustle and activity on every hand. Piles of iron of all sizes, marked for shipment to different parts of the country, kegs of nails, nuts, horse shoes, ready for teamster. Bolts and bridge iron, shafting, and. in short, iron of all descriptions, shapes and, sizes may be seen on every side.

It would take too long to describe what one sees here in detail. Heavy goods, anvils, vises, English cast steel, in common with articles made by the firm, are encountered. Offices for the control of the department are prominent, where orders are received and forwarded to the mills. The boilers which we find here furnish heat for the buildings, which are all heated by steam. From this floor also starts the Otis steam elevator, or hoist, which passes to the roof. We have preferred to walk in order to view at our leisure. This hoist is constantly in motion, and the engineer must be alway upon the platform. Every story is connected with the hoist by a telegraph. So we have simply to press a little knob and a bell is rung upon the hoist, wherever it is at the moment, and the engineer responds at once—the rooms being numbered to indicate their location. All the various offices and departments are connected with each other by speaking tubes and bells. A watchman's clock in the office stretches its arms of steel wire into every room in the buildings, and must be telegraphed to from points, during every half hour of the night. The telegraph which we noticed in the main offices runs to the rolling mill and blast furnace, situated at different points four miles distant, also to Tonawanda, a stretch of 12 miles, where Pratt & Co. are largely interested in the Niagara River Iron Co. The Messrs. Pratt & Co. manufacture very largely iron of all varieties and sizes, together with a multitude of articles made therefrom, including nails, spikes, nuts, washers, bolts, fish-plates and spike bolt blanks, coach screws, boiler rivets, &c., &c. The Buffalo forged horse nails are also manufactured here.

The works known as the *Buffalo Iron and Nail Works* are located on Niagara Street and on the Niagara River, four miles below the stores. The iron and other produce is brought to the store by means of tugs and boats on the canal, and also by teams. The works cover a large amount of land, two-and-a-half acres of the same being enclosed and covered with slate roofing. The Canada Southern, New York Central, Grand Trunk, Great Western and Erie Railways are to be connected with the mills by side tracks—part being already built—the Erie Canal and New York Central Railroad passing directly through the yards.

The extent and importance of Pratt & Co.'s investments have largely entered into the development of the manufacturing interests and jobbing trade of Buffalo, which has now become a large manufacturing city, and is yearly growing in influence and prosperity. Consequent upon the location, the shipping facilities, and most perfect arrangements for the production of iron, the firm are enabled to compete successfully with the largest iron manufacturing centers of America.

Pratt & Co. employ over twelve hundred men in all the branches of their business, and have an immense trade with railroads, dealers and manufacturers throughout the country. The capacity of production is more than two thousand tons manufactured iron, &c., per month. Being extensive manufacturers themselves, they can give superior facilities in the general trade. There has been lately erected a structure, in connection with the mills, five hundred feet long, for the manufacture of composite beams, girders and joists, iron bridges, iron roofs, and iron framing of every description.

Pratt & Co. have been engaged in the iron and hardware trade for more than forty years, and the firm is well known as one of unlimited resources and credit.

The Iron Age Directory

and Index to Advertisements.

Metallurgical.

Oxide Dry Bottoms for Mill Furnaces.

We condense the following from the paper read before the Iron and Steel Institute, by Mr. Thomas Greener, of Darlington, on the oxide dry bottoms for mill furnaces :

The author began by describing the importance of the puddler and the puddling furnace in the manufacture of iron. He asserted that the puddler could never have the power to enable him to make good iron with an inefficient or unsuitable lining or fettling for his furnace. He then described the catalan, or Corsican forge, which still survives in the Pyrenees, and a few other isolated localities in the South of Europe, from which wrought iron is made direct from the ore by one furnace. From this he remarked that the unity and harmony of working had been disturbed by the multiplication of furnaces in modern times. This had been done in the struggle to produce such quantities as the world's increasing demands required. It had been done, however, at the expense of quality, and of the control or power over the materials used in the process to produce iron best suited for the purpose to which the iron is intended to be applied. He maintained that this union and harmony, to some extent, can be restored, and that power to control quality with less waste will be accomplished by the adoption of the "oxide dry bottoms," also that this process is capable of adapting itself to carry out with efficiency, and to work in harmony with all the modern improvements for producing large quantities of finished iron. Mr. Greener stated that the power to work on an oxide dry bottom for a mill furnace in the same way as sand is no longer a theory, but an accomplished fact, the process having been in actual every-day use for six months past at the Skerne Iron Works, Darlington, as well as at other places. Henry Cort was then referred to, who, in 1784, introduced the reverberatory puddling furnace. The history of the puddling furnace, Mr. Greener stated, is, from this period, the history of the material used for lining or fettling the sides and of the materials used for the bottom of the furnace. Samuel Baldwyn Rogers was then introduced. He had, in 1820, at great trouble and cost to himself, induced the ironmasters to abandon sand, which had been previously used as a bottom for the puddling furnace, and to adopt the iron cinder bottom in its place. The sides of the furnace were, however, still left unprovided for with any certain reliable fettling, and continue to be so up to the present time. Mr. Greener then reviewed all the kinds of fettling now used for the sides of the puddling furnace, such as limestone, blue billy, bull dog, Swedish magnetic iron ore, hematite ore, pottery mine, and he asserted the only approach to a suitable fettling is the artificial oxide obtained as cinder from the ball furnace, the cinder bottom mill furnace, and the large reverberatory furnace, used entirely for making this cinder for fettling. He contended that the cinder derived from the oxide dry bottom is superior to any he had named. It was capable of not only fettling the sides of the furnace, but also of supplying all that is necessary to keep up the lining for the bottom of the furnace, and thus dispensing with the scrap ball. He then drew attention to the mill furnaces as they now exist. The history of these furnaces is the history of the material composing the bottom of the furnace. He showed that neither the sand bottom nor the liquid cinder bottom can co-operate with the puddling furnace on the one hand, and with the rolling mills on the other. He contended that here also there was an absence of harmony and self-dependence. He further minutely described the operation of the sand bottom, showing the loss of cinder that is absorbed by the sand, but that from it the iron can be "rolled off." The liquid cinder bottom was then examined, and shown to be a great waster of iron, by its abstracting from the pile that is being heated. The number and variety of the mill furnaces was stated to be undesirable. One kind of furnace only is needed, and can now be obtained for all heating purposes. The continual search for a suitable material for the mill furnace bottom was dwelt upon as a proof that present arrangements are not satisfactory. Mr. Greener then described the new process, showing how the oxide dry bottom is made—the alterations costing only from 20s. to 30s. per furnace, and when new furnaces are to be built no extra expense is needed. The *modus operandi* under the Greener and Ellis patent in altering sand bottom furnaces, was to cut up the sand to a depth of 4 in. at the foreplate, sloping down toward the back, say 6 in., and then to cover the surface with broken ore, or if preferred, with fine oxide; on the top of that the bottom is made, composed of coarse ground oxide, sloped down toward the flue, where a spout is placed to let off the melted fettling. The piles in all cases are placed on a dry bottom, the same as on sand, and as they heat the cinder runs down to the flue; and the principal advantages claimed are, that there are not two sorts of bottoms used in double heating, and the waste of iron when the lower part of the pile is immersed in liquid, as in the case of cinder bottoms, is avoided; that less time is required by the puddler to complete his shift; that no foreign materials need be purchased for fettling puddling furnaces, nor any sand for bottoms of mill furnaces. In the discussion which followed, some difference of opinion arose as to the welding in double heating; Mr. Williams contending that the first heat was merely required to draw the pile together, and that the actual weld between the pieces took place in the second; other gentlemen being of opinion that the weld should be done at first, and that only a waste heat, sufficient to roll off, was needed in the second.

Mr. Snelus questioned the quantity of ore required, and remarked that very few of them ever contained less than 10 per cent. of silica, and gave it as his opinion that calcined puddling furnace cinder would make better fettling than any obtained from the mill furnaces; neither did he consider that any improvement in quality would, as claimed by Mr. Greener, be obtained by the use of the dry oxide.

The Iron Age.

New York, Thursday, June 5, 1873.

DAVID WILLIAMS . . . Publisher and Proprietor.
JAMES C. BAYLES . . . . Editor.
JOHN S. KING . . Business Manager.

The Iron Age is published every Thursday morning, at No. 10 Warren Street, New York, on the following terms:

SUBSCRIPTION.

Regular Weekly Edition...$4·00 a year.
Semi-Monthly............... 2·00 "
1st and 3d Weekly Nos. in each month.
Monthly..................... 1·00 "
1st Weekly No. in each month.

ADVERTISING.

One square (12 lines, one inch), one insertion, $2·50; one month, $7·50; three months, $15·00; six months $25·00; one year, $40·00; payable in advance.

All communications should be addressed to

DAVID WILLIAMS, Publisher,
10 Warren St., New York.

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10 Warren St.,

NEW YORK.

CONTENTS.

Classified List of Blast Furnaces in the United States.

On another page of this issue we publish a list of blast furnaces in the United States, giving the names of owners, location, number of stacks, fuel used, date of completion, whether in blast in 1872 or not, with other information of interest and value. This list, compiled by Mr. James M. Swank, Secretary of the American Iron and Steel Association, is probably the most thorough and accurate enumeration of American blast furnaces ever given to the public, and we are informed that its preparation has been attended with no little trouble, notwithstanding the facilities enjoyed by the compiler in his official connection with the Iron and Steel Association. Perfect accuracy is not claimed for it, but it is much nearer complete than any list previously published, and our iron masters will appreciate the advantage of putting the compiler in possession of such information as may be needed for intelligent revision of the list, at their earliest convenience. A comprehensive and accurate directory of blast furnaces in the United States has long been needed, and the one we publish this week will be found very useful for reference.

We begin this week the publication of a series of articles of great value and interest, by Prof. R. H. Thurston, of the Stevens Institute of Technology, on molecular changes in the structure of iron and steel. This is an important addition to the series of papers called out by the experiments of Mr. Oliver Williams, of Catasauqua, in developing both a fibrous and a granular, steely fracture in a bar of neutral rolled iron subjected to different temperatures. Professor Thurston's views, which are formed from careful investigation and experiment, will be found to differ somewhat from those of most standard authorities, and his conclusions will be read with interest by ironmasters and engineers. This was, we believe, the last work completed by Professor Thurston before leaving for Vienna to prepare his official report upon machinery at the exhibition. The subject is one which merits more careful and thorough investigation than it has received in this country, and we would renew the invitation before extended to all who have examined the phenomena connected with molecular changes in iron and steel at different temperatures, to take part in the discussion.

We are glad to notice that our enterprise in securing for publication the illustrations needed to explain the workings of systems and inventions described in the papers read before the Iron and Steel Institute at its last meeting, is fully appreciated by the iron masters of the country. The demand for our issue of May 29th, containing the detail drawings and sectional views of the Siemens Regenerative Furnace for the production of malleable iron and steel direct from the ore, has exceeded our expectations, although we have so far been able to meet it. The illustrated paper by Mr. Jeremiah Head, of Middlesbrough, on an improved method of preventing shocks in rolling mill rolls, which appears in this issue, possesses even more of general interest. We expect next week to give our readers a description, fully illustrated, of the Neville Furnace for making wrought iron direct from the ore. This furnace is not costly to build, while the results reported have been remarkable. The subject deserves the attention of those interested in iron production.

The Protection of Cities from Conflagration.

The conflagration which a few days ago supplemented the disasters of the greater conflagration of last November, by destroying ten additional squares in the business portion of the city of Boston, may be regarded as showing how slow even a highly civilized community are to profit by the teachings of experience, and how apparently reluctant to regard the misfortunes incurred through past mistakes as warnings to be heeded that greater misfortunes may be averted in the future. Only a few months ago a conflagration so disastrous that we have only one greater than it recorded in our history, broke out in the city, destroying hundreds of structures and property to the amount of many millions of dollars. There was no difficulty in tracing the cause of this appalling calamity, or in ascertaining why the fire gained such headway and spread so rapidly. The people of Boston had been warned repeatedly that their characteristic system of constructing buildings exposed them to great danger from fire; but either they did not heed or would not believe these warnings, and when the hour came for the fulfillment of those prophesies, they were but poorly prepared for the desperate emergency they were called upon to meet. Here was an experience which should have impressed its lesson deeply upon the minds of the owners and occupants of buildings, showing them the immediate and urgent necessity for remedying the defects of construction which had led to such fatal results, and of making adequate provision against a possible repetition of the calamity which had fallen so heavily upon them. As if to impress them still more powerfully with a source of danger, a second conflagration—happily of small importance compared with the first—broke out and raged for hours within a fortnight of that which preceded it. Probably the lessons thus taught were not wholly lost upon those upon whom devolved the duty of rebuilding the burnt district, for we learn that the structures now going up are, generally, built with more regard to fire proof qualities than those destroyed; but it seems to have been lost altogether upon those who escaped the ravages of the great fire, and that which so closely followed it. On Thursday last a fire broke out in one of the most crowded districts of the city, under circumstances which, it would seem, were peculiarly favorable to its prompt suppression. It began at an hour when the whole city was astir, the weather was pleasant, there was but little, if any, wind to aid in spreading the flames, and the streets were more than ordinarily free from obstructions. And yet about three acres were laid waste, and many valuable buildings destroyed with much of their contents. Why was this possible? For precisely the same reason that the greater destruction was possible last November. The fire found the same means of speeding from roof to roof and from building to building in the one instance as in the other. Had the owners of property seen and realized the importance of expending a few thousands of dollars in precautionary measures, a loss aggregating millions would have been averted; but they closed their eyes to the defects of construction which encouraged the spread of the fire last year, and trusting to Providence or good luck to escape the consequences of the mistakes to which their attention had been so sharply called, saved the cost of necessary alterations that they might, as now chances, have the more wherewith to rebuild more wisely. We sympathize deeply with those upon whom the losses of this conflagration have fallen, and have no wish to reproach them with what seems to have been an almost total disregard of precautions so lately shown to be necessary to insure safety against widespread and disastrous conflagration; but the lessons taught by the misfortunes which have befallen our sister city should not be allowed to pass unheeded, and even unwelcome truths should be told when, as in this instance, they point a useful moral.

If experience of great fires has taught us anything, it is that no city is exempt from the danger of sweeping conflagration in which that danger has not been intelligently guarded against. What precautions of safety are most necessary may be briefly stated, and in the order of their relative importance:

1st. So far as possible, every building which adjoins or is in close proximity to another, should be so constructed that, under ordinary conditions, it would impose a substantial barrier to the spread of flames. All new buildings erected within city limits should be required by municipal ordinance to be of some non-combustible material, and to be measurably fire-proof outside. If wooden doors, window casings and sashes are employed, iron shutters and outside doors should be required. No wood should be permitted on the outside of buildings, and roofs should be so constructed that a fire could be built upon them without danger. The same general provisions of the law should apply to old buildings, and even if it involved the removal of wooden structures, the city could better afford to pay for houses condemned and ordered to be torn down, than to permit them to remain where they would aid in spreading fire. As to old buildings of brick and stone, there is no difficulty in making them measureably fire-proof—at least, so far as is necessary to protect them from heat from without and from embers falling upon them. This can be done at moderate expense, and had it been done more generally in Boston the recent fire would probably have been confined to the immediate locality in which it started. Our warrant for this statement is found in the report of Fire Engineer Durell, of the Boston department, who says of the conflagration of Thursday last:

> The first attention of the department was given to the surroundings in the rear of Washington street, west side. As the fire has left it, the fringes are of the most combustible material, and it was these that threatened to extend the flames to Tremont street. Of the more tinder-like structures left are Whittier's large carriage manufactory, buildings filled with chemicals, a large stable, a block of wooden tenement houses, the open and uncompleted *Pilot* building, and these all within a hundred feet of the rapidly burning Haley, Morse & Boyden furniture manufactory and the Bonney stable. Had the fire been allowed to spread in this direction, the Masonic Temple must inevitably have been destroyed, and with it the magnificent hotels, Boylston and Pelham. But by the persistency of the department the flames were held in check almost where they began. Some idea of the combustible material of the furniture manufactory may be learned from the fact that in one story alone some twenty barrels of varnish were stored, for use in the business, while also the material of the manufactory was of a like combustible nature.
>
> On the eastern boundary there are standing scorched shells of warehouses that are old in construction, and have more than the usual amount of exterior wood finish; also buildings slightly touched, that are filled with boxes and light manufacturing materials. The buildings on the southern boundary, on the opposite side of Essex street, less than fifty feet from the now standing shell of masonry that sent its volume of flames and brand in burning out, had also a large amount of combustible finish.

Whether the people of Boston, thrice warned, and of other cities exposed to danger from the same or similar causes, will now appreciate more fully the importance of looking more carefully after tinder roofs and inflammable ornaments, remains to be seen.

2d. Provision should be made in every city, especially those on the seaboard or with rivers near at hand, for the most general distribution of a water supply adequate to every emergency. The extent of the Chicago fire was due in a great measure to the failure of the water supply, and the same difficulty was experienced in the great Boston fire. It is within the possibilities of engineering science to provide an unfailing water supply for street sprinkling, fire extinguishing and other purposes; and while water may not be the best or most economical agent for putting out fires, it is the only one we yet have adapted to use on a large scale, and so long as we are dependent upon it, let us have it in an abundance. It is better than nothing, and the expense of supplying it would be more than saved in benefit to the public health and protection against conflagration.

3d. Every building should be supplied by its owner or occupant with means for putting out fires originating within it. This is a duty which, in too many instances, is shamefully neglected. We know of large warehouses filled with highly inflammable merchandise, in which absolutely no provision is made to put out a fire. Not even a row of water buckets is provided, and should a fire break out it would probably get uncontrollable headway before any one would know what to do, or where to find the means of extinguishing it. For such reckless disregard of obvious duty, no possible excuse can be pleaded. Morally, it is a crime which ranks next to arson—legally, it should at least be punishable as gross carelessness, if resulting in destruction of the property of others. What the best means of extinguishing fire may be we are not prepared to say, but any practical mechanic could suggest half a dozen means, any one of which might be introduced at a small expense, and be found effectual under ordinary conditions. It should also be understood that no man has a right to leave unguarded, buildings filled with merchandise liable to take fire. Competent watchmen would save millions of dollars worth of property from fire annually in New York alone, and the public interest demands that our warehouses and stores should not be left to take care of themselves at night and on Sundays and holidays, especially during the months when stoves and furnaces are in use. These are matters which must be left to the discretion of property owners, but an enlightened self-interest should prompt every man who owns or occupies a building to observe every precaution calculated to protect his own property and that of his neighbors.

4th. Every city should provide itself with the most approved and effective fire apparatus which can be obtained, and be ready at all times to adopt and employ every invention and improvement which, upon trial, proves efficient as a means of saving property from fire and water. Economy in this respect usually leads to reckless waste in the end. We have also learned the value of thoroughly organized and perfectly disciplined fire departments, under the direction of competent and experienced engineers. In this respect neither Chicago nor Boston were as well provided as New York. It is the testimony of those best able to judge that we have saved many times the cost of our fire department annually, and it is not improbable that a yet more liberal expenditure would be attended with still greater economy.

It may well excite surprise that truths so simple and practical as those we have stated, and which cannot fail to commend themselves to the approval of the reader, should possess so little of public interest. Why is it that property owners close their eyes so persistently to the teachings of experience, and manifest so little apparent desire to guard against fire, although they well know that the wealth annually destroyed by this dangerous element represents a greater value on the average than the waste of war. The question is easily answered. We have learned to put our trust in that most delusive of systems, fire insurance, forgetting that insurance wastes a great deal of wealth without creating any, and that its sole function is to effect an inequitable and unjust distribution of losses resulting in part—perhaps in great part—from the carelessness which it encourages. We have learned to believe that it is cheaper to build houses liable to burn down and insure them while they last, than to build fire-proof at a greater cost; and, rather than make our buildings secure, we pay so much per year to some company which will agree to carry our risk and make good our losses from fire, if it cannot find some plausible pretext for refusing to pay our claims. It is a good thing for the public that insurance is becoming more costly, and that the companies are learning to discriminate more critically against the doubtful risks they were formerly so ready to assume. The next best thing to having no insurance system at all is to have the premium rates on hazardous risks so high that precaution, against fire will be cheaper than policies; but until rates are very much advanced above the present average, or nine tenths of the companies are wiped out, there is but little reason to expect any general or systematic public effort to reform the evils which have rendered great conflagrations possible.

State Regulation of Railroad Tariffs.

An important decision has been reached in the Supreme Court of the State of Minnesota, in the case of Blake agt. the Winona & St. Peter Railroad Company, affirming the constitutional right of the State to enact laws regulating the charges of railroad companies operating lines within its limits. As this is, we believe, the first time this question has been brought up in the courts without any complications, the decision will be received with interest, as establishing a precedent for the ruling of courts in other States when called upon to determine the validity of legislative enactments fixing the rates which railroad companies are permitted to charge upon passengers and freights. The facts of the case are, briefly, as follows: On the 1st of May, 1871, a law went into operation in Minnesota providing that all railways operating in the State should be deemed public highways, and that all persons should be entitled to have their property transported over them at rates not exceeding those specified by the act. To test the validity of this law, an action was brought in June, 1871, in the District Court of Olmstead county, the form of action being one of replevin, to recover two bales of cotton shipped by rail from Chicago to Rochester, Minn. At Winona the goods came into the possession of the road named above, which received them from the last preceding carrier, and carried them to Rochester. Upon the arrival of the goods at Rochester, the plaintiff tendered to the company's agent the back charges which had been advanced to the preceding carrier, and freight over the company's own road in accord with the rates as established by the law in question. The company's agent refused to accept the amount so tendered, and demanded payment after the company's established rates, or tariff, which were some 50 per cent. higher than those allowed by the law. Upon the agent's refusal, in consequence, to deliver the goods, this action was brought. The company being equally desirous with the plaintiffs to make the case a purely test case, it was stipulated that if the law was constitutional and valid, and binding upon the company, then judgment should be for the plaintiffs—otherwise for the defendant. Upon this stipulation, which left nothing before the court but the naked question of constitutionality, the case was submitted to the District Court at the January, 1872, adjourned term. The Court rendered a decision in April following for the defendant, holding the law to be unconstitutional. An appeal was at once taken to the Supreme Court, where the case was argued at the last October term, with the result above indicated. This, as we have said, is, so far as we know, the first decision rendered by any Appellate Court in this country in a case where the point at issue was simply the constitutional right of the State to fix the maximum rates which railroads may charge for carrying freights.

Whether there is any occasion for satisfaction with this decision, may be considered doubtful. If the action of legislative bodies was always tempered with judgment and discretion, the right to regulate railroad charges might be exercised with benefit to the community in the enactment of laws preventing extortions and unjust discriminations. But judgment and discretion do not always preside over legislative deliberations, and if public sentiment is stronger than the railroad lobby, the tendency will be to enact laws in which gross injustice may be done to the railroads. Especially in the Western States, where the people seem to imagine that, if they could carry out their ideas of railroad reform, they would be able to ship goods to the East for about one-half the net cost of carrying them, the tendency to injustice in the enactment of laws regulating the tariffs of railroads is particularly strong, and in the present excited state of public opinion there is great danger that the legislatures will be called upon to enact laws to which the railroads cannot conform without disappointing the reasonable expectations of those who, upon the pledges conveyed in State charters, have been induced to subscribe the capital invested in construction and equipment. To defeat or repeal such laws the railroads would, of course, resort to every expedient to control legislation in their own interests, and the result would be endless bribery and corruption, and the final triumph of the railroads over the people. Again, the prospect of continual interference with their business would discourage the building of new roads, and thus a check would be placed upon the growth of the system and the increase of competition for freights, which would sooner lead to reform in railroad management, and to a general reduction of rates without offsetting disadvantages, than any arbitrary laws, however rigidly and successfully enforced. Certainly the power to regulate railway tariffs by law is one which should be exercised with the utmost caution, and as the necessity for that caution will only be learned from experience, it may be considered a dangerous power in the hands of the men who usually constitute the majority of our State legislatures.

Another Great Iron Strike in England.

Before the Welsh iron trade has fairly resumed its wonted activity after the almost total suspension of operations caused by the recent great strike of the coal and ore miners, the industry of the Cleveland district has been brought to a standstill by a sudden and unexpected strike on the part of the iron miners. Advices from England, under date of May 20th, report that between seven and eight thousand men have quit work, and as nothing can be done without a regular supply of ore, preparations are making to blow out the furnaces. The origin of the strike is found in the resistance offered by the masters to a combination on the part of the men, having for its object a reduction of the output of ores to about one-half the usual product of the mines. As the mine owners had no accumulations of ore to draw upon, and as the furnaces were without stocks, the output of the mines under the proposed arrangement would have

fallen far below the requirements of the district; and as the masters knew that the ultimate object sought by the men was a considerable advance in wages as soon as they gained control of the trade, they determined upon a lock-out, unless the men would agree to take out the usual quantity per day. The men refused to accept the alternative, and the lock out began. To add a new complication to the difficulties which have overtaken the iron trade in the North of England, the limestone miners have also gone out on strike, but this does not make a great deal of difference so long as the furnaces are stopped for want of ores, except that the masters have another body of malcontents with which to make peace. The importance of this strike is very great in the present condition of the British iron trade. There are 130 furnaces in the Cleveland district, producing annually about 2,000,000 tons of pig iron, and every week of idleness reduces the already limited supply of pig iron in the market by upward of 38,000 tons. We are not informed whether there is any prospect of an early settlement of the difficulty.

An amusing instance of the tendency of the American people, especially the middle and working classes, to run to the Legislature with every grievance, praying for its abatement by the enactment of a special law, is found in the following resolutions, adopted with much enthusiasm at a recent meeting of the Painters' Union, of this city, a few evenings since:

Whereas human life is estimated too lightly in our present commercial system, through the absorbing greed to attain wealth; and whereas the life of the humblest individual is as precious as that of the most exalted citizen of our Republic, and any country violating this principle is acknowledged by all right thinking minds to be a land groaning under the heel of despotism; and whereas the loss of life occurring from the use of unsafe scaffolding provided by the boss painters of this city has become alarming; therefore

Resolved, That as we are compelled, through necessity, to work for these bosses, they should be held responsible for the lives lost through their negligence in providing rotten and unsafe scaffolding; and

Resolved, That we demand the custodian of the law—our governor—to recommend to our recreant legislators the passage of an act that scaffolds shall be fit and safe before our citizens venture on them, and thus prevent misery and starvation among many poor, unfortunate families; and be it further

Resolved, That a committee be appointed to present to the Legislature a bill, through the governor, demanding the passage of a law such as the defeated "Life and Limb bill," and that this committee be empowered to bring all parties to justice who violate such laws, and consequently the laws of the land, as well as of humanity.

It would require but little reflection to convince the most obtuse painter who shouted "aye" when the above resolutions were read, that the easiest and surest way to protect life and limb would be to keep off of weak scaffolding altogether. The mechanic knows as well as the master—often a great deal better—whether a scaffold is safe or not, and if he is not satisfied with it, the best thing he can do is to refuse to trust himself upon it. We do not believe that any master painter ever knowingly or willingly exposed his men to danger by providing them with rotten tackle, unsafe ladders, or scaffolds liable to give way under the load they were expected to bear; but we have known many instances in which men have put up scaffolding so carelessly that serious, and sometimes fatal, accidents have resulted. Such legislation as that asked for by the painters would not only be powerless for good under any circumstances, but it would in all probability be productive of evil by encouraging men using scaffolding to rely rather upon the law than upon their own prudence and experience to insure them against accidents resulting from preventible causes. Evidently we have yet to learn, as a people, that the less we are governed the better our government, and that the more we trust to ourselves in matters within our own control, the better for all classes.

Mr. Charles S. Wood, a gentleman well known to the iron trade of the country, died at his residence, in Philadelphia, on the 27th ult. Mr. Wood was 73 years of age, and has been in poor health for several years, but his death was not so soon expected, as only three days before he was at his office attending to business as usual. He was president of the Cambria Iron Company, and a member of the executive committee of the Iron and Steel Association. His death will be widely regretted.

Scientific and Technical Notes.

Mr. Samson Jordan, in an interesting paper on the conditions under which

EXTRA-SILICATED PIG IRON

is produced in the blast furnace, says: Iron founders accustomed to the direction of blast furnaces and to the management of special smeltings; above all, those who have the superintendence of the charges for pig iron for the Bessemer processes, have to study the conditions under which pigs can be produced containing from 1½ to 2½ per cent. of silicium. Sometimes they have to turn out iron containing as much as 7 to 8 per cent., these being extra-silicated. These latter pigs have a peculiar appearance, the color of their fresh fracture is brighter in proportion as the percentage of silicium is greater; the grain of the iron is also larger, but is flatter and somewhat rounded, showing no sharp-pointed or salient angles. Its glister much resembles that of pure silicium; the finger slides over the fracture with quite a different sensation from that experienced from the rougher fracture proper to gray pigs rich in carbon. In the foundries which produce this class of extra-silicated iron pig it is called "*fontes glacees*"—in England, "glazed pig." Below I give the analysis of a pig iron of this nature, from the blast furnaces of Towlaw, near Newcastle:

Carbon	2·39 per cent.
Silicium	5·73 "
Sulphur	0·12 "
Phosphorus	0·13 "
Titanium	0·02 "
Nickel and cobalt	0·04 "
Manganese	1·33 "
Iron	90·21 "
Total	99·97 "

I have had occasion to study the production of extra silicated pigs in many iron works, among others, those of Heerdt, near Dusseldorf, the following details of which may perhaps be interesting: In consequence of an accident which necessitated the repair of the air conduit conveying the wind to the six tuyeres of his blast furnace, M. Butternbach, the manager, found himself obliged to work for 8 days with only three tuyeres with a low pressure (10 centimetres of mercury, in place of 15 or 18 centimeters, as ordinarily). The temperature of the wind was, in consequence of its small quantity, and the large amount of heating apparatus over which it had to pass, much elevated, reaching to 500° to 600° Centigrade. In order to incur no risks, the charge was reduced to 1250 kilogrammes (yielding an average of 38 per cent. of iron) with 1000 kilogrammes of coke and 600 kilogrammes of limestone.

The fusible matters contained in this charge, and before the formation of slag, were in the following proportions:

Silica	50	Oxygen	26
Alumina	16		
Lime	33	Oxygen	17·6
Prot'xide of m'g'nese	1		
Proportion of the oxygen of the silica to the oxygen of the bases			26 / 17·6

With this mixture a viscous slag was obtained, which, when cold, was vitreous and translucent, as are all slags rich in alumina; its color was of an opalescent blue. The corresponding casting of iron was very liquid, excessively hot; it ran into the sand furrows in quite a novel manner, without the least bubbling up, and without throwing off any sparks—behaving, in fact, like melted lead. It filled the molds quite accurately, without in any way adhering to the sand. When cold, it was very brittle, and was deficient in metallic resonance when struck. Its analysis gave:

Silicium	7·90 per cent.
Phosphorus	0·72 "
Carbon	2·00 "

This was a characteristic *fonte glacee*, glazed pig. The consumption of coke was 2100 kilogrammes for 1000 kilogrammes of iron. The iron works employing aluminous ores, as, for instance, those of Aveyron, where Mondalazac ore is used, which contains 11·5 per cent. of alumina, with only 10 per cent. of silica and 15 of lime and magnesia, the normal manufacture is of very silicated pigs, which cause much loss in puddling. When first fired, the blast furnace here always turns out extra-silicated pig, with a flat grain, containing as much as 6 to 7 per cent. of silicium. This is always accompanied with great consumption of coke. At the Saint Louis Iron Works, near Marseilles, they commonly turn out gray iron, with slags containing on an average:

Silica	33 per cent.
Alumina	15 "
Lime	50 "
Manganese, magnesia, &c	2 "

Here the pigs contain only 1 to 1·5 per cent. of silicium. In order to obtain iron for the Bessemer process containing about 4 per cent. of silicium, they are obliged to modify the proportions so as to have:

Silica	40 per cent.
Alumina	19 "
Lime and magnesia	41 "

These observations, and others analogous to these, lead me to define the following conditions as those most appropriate for the production of extra-silicated iron by the blast furnace. 1. A slow, but very hot blast. 2. A silicious, and, at the same time, very aluminous charge. The blast must be extremely hot, in order to secure the union of the silicium with the iron (it is much more difficult to fuse than carburetted irons). The blast must be slow, to give time for the reduction of silica in presence of carbon and iron. The charge must be but slightly calcareous, in order that the affinity of the lime for the silica may not impede the reduction of the latter, and, for the same reason, alumina must be present in sufficient quantity in order to neutralize the basic action of the lime. It probably plays the part of an acid, and forms aluminates.

The Japan *Weekly Mail* describes

A JAPANESE SUSPENSION BRIDGE,

lately built in the Mikado's plea ure grounds at Yeddo, as follows: "The bridge is built over a ravine filled with water which separates the Mikado's palace from his pleasure gardens, and is intended solely for his own personal use, and that of his immediate attendants. It had its origin in a somewhat fortuitous manner. The Mikado had for some time desired to have a bridge at this spot in order to avoid a long *detour* round the head of the ravine, and the Japanese had themselves attempted to build one of the ordinary bridges in use in this country. Owing, however, to the great depth of the ravine and other attendant difficulties, they found it impossible to carry out the work, and in May last Mr. Waters was applied to. He at once saw that only a suspension bridge could be built at such a spot, and notwithstanding the inexperience of the Japanese, he undertook the work—with what success we have already noted. The length of the bridge is 234 ft., the width 17 ft., and the hight from the water 60 ft. It is supported at each end by two red brick columns, 64 ft. high from the foundation, the cables being of galvanized iron, attached in the usual manner to the bridge by suspension rods, 104 in number. The hand rail is of thin wire rope, ornamented with gilt chrysanthemums and *kiri* (the Mikado's crest) and surmounted with a handsome polished *kiaki* rail. The columns at each end are united by a light iron bar, bearing crysanthemums and *kiri* in gold relief. The anchors are buried 23 ft. deep, and the bridge has been fairly tested with a rolling load of 20 tons." The Mikado took great interest in the construction of the bridge, and frequently examined it while in progress.

Kesseler offers some suggestions on the

ESTIMATION OF MANGANESE IN IRON AND STEEL

which are interesting. Having investigated the separation of iron from manganese by the use of acetate of sodium and boiling, he finds the process to be defective in proportion to the quantity of acetate of sodium employed. Direct experiments gave the following number when 300 cubic centm. of liquid was used along with 15 grammes of acetate of sodium, without any free acetic acid:

Actual percentage of manganese present	1·00	3·00	7·00	13·00
Loss of manganese in percentage	0·21	0·60	0·87	1·06

If, however, the solution of the iron be treated as follows, 1 gramme of acetate of sodium is sufficient to precipitate 1·1 gramme of iron from 500 cubic centm. of solution; and this precipitate carries down with it only from 0·02 to 0·05 per cent. of manganese, even if the iron solution contain as much as 13 per cent. of manganese, so that in such case the error is so small that it may be overlooked. The hydrochloric solution of chloride of iron is neutralized with carbonate of sodium until a permanent precipitate is formed, and then hydrochloric acid is added cautiously until the precipitate is just redissolved. The liquor then contains fourteen-fifteenths of the iron dissolved as hydrate in the chloride of iron solution, this hydrate not being separated by boiling. The acetate is then added, and the whole boiled a few minutes.

Some months ago a communication describing certain experiments on the

ACTION OF MAGNETISM ON IRON AND STEEL,

made with a view to determining whether the influence of magnetism changes in any way the internal structure and powers of resistance of cast steel, was communicated to the Academy of Sciences at Paris. In these experiments two cylindrical molds precisely similar one to another were filled with molten cast steel, one of which was, during the entire period of the cooling of the steel, surrounded by a coil (made by Ruhmkorf), through which the current from a 12-element Bunsen's galvanic battery was passed, whilst the other was allowed to cool as usual. At the expiration of ten hours the two steel cylinders were taken out, and each broken in several fragments in order to examine their internal structure, when it was found that the grain of the metal differed considerably in appearance in the two castings, the grain being visibly finer in that subjected to magnetic influence during cooling, which was found to be the case also in three instances in which this experiment was repeated. Comparative experiments were then made by M. Chedeville as to the resisting power of the two steel castings to extension and compression, the results of which indicated that the magnetized steel offered in every instance less resistance than the other.

Mr. T. T. Morrell has recently made known a new

METHOD OF ESTIMATING SULPHUR IN IRON AND STEEL,

which is described as follows: By passing the evolved gases through an ammoniacal solution of cadmium oxide (or a solution of sulphate to which an excess of ammonia has been added), a precipitate of cadmium sulphate is obtained, which can be at once collected upon a small filter, dried at 212° F. and weighed. The phosphuretted hydrogen evolved in the solution of the metal, together with the sulphuretted hydrogen, causes no precipitate in the solution. The presence of ammoniacal salts would also prevent any precipitation of carbonate of cadmium by the traces of carbonic acid in the air drawn through the apparatus by the aspirator after the metal is dissolved. However, the aspirated air could easily be passed through potash solution, to remove its carbonic acid. To prevent the precipitation of oxide of cadmium on the filter, the precipitate should be washed with distilled water containing diminishing quantities of ammonia. If, in very accurate estimations, it is necessary to estimate the minute quantity of sulphur left in the solution and residue of the metal, this can be done as usual and added to that found as above. Five test analyses of a piece of Bessemer steel known to contain above ·13 per cent. sulphur gave as follows:

First	·124 per cent.
Second	·124 "
Third	·137 "
Fourth	·125 "
Fifth	·124 "

A paper lately read by Mr. C. W. Cooke, before the Institution of Mechanical Engineers, gives some interesting information respecting

WENHAM'S HOT AIR ENGINE,

from which we take the following: The engine has a single acting vertical cylinder, the upstroke being made by the pressure of the heated air below the piston, and the engine is carried through the downstroke by the fly-wheel. The external cold air, admitted by an inlet valve into the top of the cylinder during the downstroke, is compressed during the first half of the upstroke, and is then delivered during the remaining half stroke through a weighted valve into the furnace chamber; the delivery passage is divided into two branches, one conveying a small portion of the air beneath the fire grate for maintaining the combustion, while the greater part of the air is conveyed by the other passage into the upper portion of the furnace chamber above the fire. A swing valve at the junction of the two branch air passages determines the relative proportion of air delivered through each, and this valve being controlled by the governor of the engines, regulates the supply of air to the fire, and consequently the combustion of fuel, exactly in proportion to the work done by the engine. From the furnace chamber the heated air, mixed with the products of combustion, is admitted by a lifting valve into the bottom of the working cylinder during the upstroke, and in the downstroke it is discharged into the atmosphere through an exhaust valve, these two valves being opened alternately by a cam on the fly-wheel shaft, and closed by a spring. The furnace chamber is of cylindrical shape, lined with a thick wall of fire-brick containing a number of highly heated vertical flues, through which the products of combustion pass, causing a perfect combustion of smoke; the central part of the furnace is filled from the top with a charge of fuel sufficient to last throughout a day's working, and the furnace is then closed air tight, both a ttop and bottom. The working surface of the cylinder is protected from exposure to the heated air and products of combustion by a protecting drum below the piston, adopted from previous air engines, which nearly fills the diameter of the cylinder, and is of greater length than the stroke of the piston; and any dust entering the cylinder is blown out at the exhaust from the bottom. The piston is lubricated with a dry plumbago powder, and in practice the cylinder is found to maintain a good working face, and to be as durable as those of steam engines. This air engine has proved very successful for cases where a small amount of power is required, and has the advantage of working for long periods without requiring attention, either for firing or for the engine, and with freedom from the risk of explosion or fire attending the use of a steam engine.

A correspondent of the *Mining Journal*, describing

AN ANCIENT PIG OF LEAD,

made in the time of the Emperor Adrian, by Romans in England, and now preserved at Linley Hall, Stropton, by Mr. Jasper More, says: It was found about sixty years ago in the excavations about the Roman Gravels Mine. It bears the inscription, "Imp. Hadriani, A.V.G.," and thus points to the Emperor Adrian, to whom I referred in my note. The pig weighs 190 lbs., and is said to be in perfect preservation. Another, also bearing the same inscription of the Emperor Adrian, has been more recently found in the parish of Snead, below an entrenched camp, called the Roveries, about one mile from Linley Hall; and the conclusion is that the Romans smelted their ores on the spot, as the Snailbech people do at the present day. These pigs also show that mining operations were carried on in Shropshire at the date I referred to, A.D. 120. In reference to the productiveness of the mines in the district, Mr. More has calculated from records in his own possession, and other sources, that in the parish of Shelve alone at least 60,000 tons of lead ore had been raised, worth in money value upward £1,000,000 sterling, before the operations to which my attention was directed had been commenced.

Gas Machines and Carbureters.

BY JAMES A. WHITNEY, M. E.

It has been a familiar fact, I know not how long, that air brought in contact with volatile hydro-carbons will absorb enough to constitute a kind of combustible vapor capable of generating light. This constitutes the essential principle of the numerous so-called portable gas generators now in use, many of them advantageously so, when care is taken to guard against danger of explosion and against the clogging of the pipes from the condensation of the hydro-carbon. This latter is quite likely to occur when a low temperature is permitted, as the illuminating fluid is not by any means a fixed gas. The same, or essentially the same, principle is embraced in three quite different classes of mechanism, viz., the common portable gas machine, the gas carbureter, and the hydrogen carbureter. The first involves simply the conditions mentioned, together with a large surface of the hydro-carbon exposed to the air current; the second involves the substitution of coal-gas for the air, and is advantageous when the proportion of olefiant or heavy carbureted gas is small; and the third employs hydrogen gas produced from water by chemical agencies as the fluid to be charged from or with the hydro-carbon. Each of these has been the subject of much experiment, but the first named is the only one of the three that has been at all extensively introduced into common use. But each is capable of adoption for many purposes, in the lighting of isolated dwellings and manufactories, railway cars, vessels, and mines.

The essential elements of a portable gas machine, so called, must be a receiver for the hydro-carbon, frequently provided with mechanism for agitating the contents to bring it into more intimate contact with the air; a forcing device, most approved in the form of a miniature gasometer, for forcing the air into the receiver; and pipes leading away to the burners, which may be of any ordinary or suitable construction. In the most approved apparatus the receiver and its immediate adjuncts are placed in a stone or brick out-house at some little distance from the building to be lighted, an arrangement that effectually avoids the objections sometimes urged against such devices at the instance of insurance companies. A fair example of this variety of gas machines is afforded by an apparatus which I examined a few years since, as it was applied on trial at the Astor House, with apparently satisfactory results. It consisted in the main of "an external cylinder or vessel containing gasoline, and of an internal drum, rotated by means of a weight and provided with spiral buckets filled with 'excelsior,' or fine wood shavings. As the drum revolved, the shavings were carried through the hydro-carbon, and becoming thoroughly saturated therewith, were lifted therefrom. The surplus liquid draining from the shavings left the latter coated with a thin film, and this absorbed by the incoming air passed accordingly into vapor conducted in the ordinary manner to the burners." Another plan comprised the alternate dipping of a mass of fibrous substance into the hydro-carbon, and the raising of it into a position where the air could readily permeate and pass through it. In another, a block of pumice stone had a quantity of the gasoline, or equivalent volatile fluid, forced into it by a pump, after which the air current was driven through until the fluid was wholly exhausted from the stone. It was suggested as an improvement on this, that a reservoir of the hydro-carbon be placed at a higher level than that of the pumice, and liquid allowed to flow slowly, or with regulated speed, to the latter. In this apparatus, it may be mentioned, the air was forced in by a bellows actuated by clockwork, the latter being, of course, the usual means of operating the moving parts of such apparatus. Whether or not some appliance of this kind, used in connection with the means of air supply of pneumatic drills, would not prove a means of illuminating mines far superior to the primitive devices now in use, is a matter worthy of thoughtful consideration by those more immediately concerned.

The simple passage of ordinary coal gas through a porous substance saturated with naphtha or gasoline, is a thing easy of accomplishment, but to do so in such manner as to avoid the use of unsightly appliances of more or less liability of explosion, and expense greater than justified by the improvement indicated by the photometer, is far from being as readily done as appears at first sight. This is shown by the constant succession of new devices designed to accomplish this result. Some of these being applied immediately adjacent to the burners are clumsy in appearance, while others, located at a greater distance, permit condensation in the pipes. Probably the best position would be at or near the meter. But it must be remembered that the utility of this method of enriching gas is in the inverse ratio of the quality of the latter: with bicarbureted hydrogen of the best quality, the charging of the gas in this manner would be superfluous.

In the hydrogen gas apparatus hydrogen is generated in the usual manner by the action, in the presence of water, of sulphuric acid on zinc or iron, the working parts being commonly so arranged that when the pressure of evolved hydrogen has reached a given point the metal is automatically lifted from the solution and the evolution is stopped. The gas is then caused to pass, on its way to the burner, through fibrous material charged with volatile hydro-carbon, which it absorbs in the same way, as, under like conditions, does moist air, but with a better illuminating effect. I have seen in such apparatus a most excellent light—a steady, broad and lambent flame—produced, but the use of oil of vitriol is objectionable to most people, the transport of the material an indirect, but none the less, obstacle to its employment for the purpose at a distance from large cities, and the machine itself, when charged, not wholly free from liability to explode. For this reason I am led to doubt its immediate utility, although it has been frequently advocated, and, in some instances, tested, under especially trying circumstances. Of such were the experiments made by the Erie R. R. Co., two or three years since, in lighting railway cars. In these the apparatus was located under the car body, and comprised two cylinders, one above the other. The uppermost contained fine wood shavings saturated with gasoline; the lower constituted the hydrogen generator, from which the gas passed to the other, and thence to the burners. It was expected that one apparatus would keep four burners in blaze during fifteen hours without recharging. The trials were favorably reported upon, but I doubt the superiority of the plan over that of compressing ordinary illuminating gas in cylinders. But although, as I have intimated, each of the three systems mentioned has manifest and serious defects, I doubt not that each, by gradual improvements and modifications, will eventually be adopted for certain important, although specific and minor, purposes.

Mr. A. L. Holley gives a very sensible answer to the much discussed question, "What is Steel," in the following language: "Steel is an alloy of iron that is cast while in a fluid state into a malleable ingot. Any radical nomenclature founded on chemical differences leads to endless mistake and confusion. If steel is defined as an alloy of iron containing carbon enough to harden it when it is heated and plunged into water, then puddled iron, although laminated and heterogeneous in structure, may be steel, and the finest product of the crucible, although crystalline and homogeneous in structure, may not be steel. The fundamental and essential difference between st el and all other compounds of iron is a structural difference, and it is always easily determined, while steel and wrought iron cannot always be distinguished by chemical analysis. The same proportions of carbon, manganese, silicon and other elements may exist in and similarly affect any malleable alloy of iron. Steel is, therefore, an alloy of iron which is cast into a malleable mass."

The Ashland *Journal* says: "Buena Vista furnace 'blowed in' on the 14th inst., and will make a full blast again this season. She made last year over 4000 tons, which, we understand, is all sold, and an additional thousand tons could have been disposed of. Buena Vista makes a very superior foundry iron, and has ores in variety of a quality to give a ton of iron from two and a quarter of ore, bank weights. This furnace has a fine coal field on its lands, and we know of no company so well arranged to be in the make of stone coal pig as the Buena Vista."

The ground has been broken at Hartford for the erection of the new car factory and repair shops for the New York, New Haven, and Hartford Railroad, which will double the present capacity of the works, and add about 200 to the working force.

CLASSIFIED

List of Blast Furnaces

IN THE UNITED STATES.

Showing (1.) the names of Furnaces in each State, alphabetically arranged; (2.) names of owners; (3.) where located; (4.) post office address of each; (5.) kind of fuel used; (6.) when built; (7.) number of stacks; (8.) in blast in 1872, or not; (9.) miscellaneous information.

Compiled by the Secretary of the Iron and Steel Association.

MAINE.

Katahdin Iron Works, O. W. Davis, Jr., Portland. Charcoal. One stack, 38 by 9½; built 1845; went into blast April, 1873, after a long rest.

NEW HAMPSHIRE.

New Hampshire Iron Co., Wm. E. Coffin & Co., Franconia, Grafton co. Charcoal. Built in 1861; went out of blast in 1865.

VERMONT.

Brandon Iron Works, Brandon Iron Works, Forestdale, Rutland county. Abandoned.

Dorest Iron Co., Dorest Iron Co., East Dorest, Bennington co. Abandoned.

Pittsford Furnace, J. Prichard, Pittsford, Rutland co. Charcoal. In blast in 1872; formerly Vermont Iron Co.; capacity from 8 to 10 tons per day.

Shaftsbury Iron Works, Geo. W. Sweet & Co., lessees, South Shaftsbury, Bennington co. Charcoal. In blast in 1872; capacity from 8 to 9 tons per day.

Tyson Iron Co., Tyson Iron Co., Plymouth, Windsor co. Not in blast and probably never will be.

MASSACHUSETTS.

ANTHRACITE.

Pomeroy Furnace, Pomeroy Iron Works, West Stockbridge, Berkshire co. Burned and rebuilt in 1872; out of blast 5 months (June to Nov.) in 1872.

CHARCOAL FURNACES.

Cheshire Furnace, Richmond Iron Works, West Stockbridge, Berkshire co. In blast in 1872.

Lanesboro' Furnace, J. L. Kolby, Lanesboro', Berkshire co. In blast in 1872.

Lenox Furace, Lenox Iron Works, Lenox Furnace, Berkshire co. In blast in 1872; leased by Taylor, Church & Coffing.

Richmond Furnace, Richmond Iron Works, West Stockbridge, Berkshire co. In blast in 1872.

Van Deusenville Furnace, Richmond Iron Works, Great Barrington, Berkshire co. In blast in 1872.

CONNECTICUT.

CHARCOAL FURNACES.

Barnum, Richardson & Co., Lime Rock, Litchfield co. This firm have 3 furnaces; two stacks in blast and one built in 1873.

Chapensville Furnace, Landon & Son, Chapensville, Litchfield co. In blast in 1872.

Cornwall Iron Co., Cornwall Bridge, Litchfield co. In blast in 1872.

Hunts Lyman Iron Co., Huntsville, Litchfield co. In blast in 1872.

Kent Iron Co., Kent, Litchfield co. In blast in 1872.

Lime Rock Iron Co., Lime Rock, Litchfield co. In blast in 1872.

Landon Iron Co., Sharon, New York. Furnace in Litchfield co., Conn.

NEW YORK.

ANTHRACITE.

Burden Iron Works, H. Burden & Sons, Troy, Rensselaer co.

Buffalo Union Iron Works, Buffalo Union Iron Co., Buffalo, Erie co. Three stacks; in operation in 1872. Annual production, 30,000 tons.

Cedar Point Iron Works, Cedar Point Iron Co., Port Henry, Essex co. One stack in course of erection.

Clove Furnace, Peter P. Parrot, Greenwood Iron Works, Orange co. In blast in 1872.

Charlotte Furnace, Rochester Iron Manufacturing Co., Rochester, Monroe co. One stack.

Columbia Furnace, Columbia Iron Co., Hudson, Columbia co.

Cold Spring Furnace, Cold Spring Iron Co., lessees, Cold Spring, Putnam co. Formerly Phillips' Iron Works; in blast for six months of 1872.

Corning Iron Co., Corning Iron Co., Albany. Two stacks, each 61x16; in blast in 1872.

Crown Point Furnaces, Crown Point Iron Co. Crown Point, Essex co. Two furnaces in course of erection; will be completed in December, 1873; dimensions of each, 60x16. This company is building a railroad 12 miles in length, from the furnaces to their ore beds.

Fallkill Furnaces, Fallkill Iron Co., Poughkeepsie, Dutchess co. Two stacks.

Fletcher Furnace, Pratt & Co., Buffalo, Erie co.

Fort Edward Furnace, J. A. Griswold & Co., Fort Edward, Washington co.

Franklin Iron Works, Franklin Iron Works, Franklin Iron Works, Oneida co. Two stacks, 54x14 each, one stone and the other iron; in blast in 1872. Pig iron is produced from fossiliferous red hematite ore brought from the company's beds, three miles from the furnaces.

Hudson Furnace, Hudson Iron Works, Hudson, Columbia co.

Manhattan Furnaces, Manhattan Iron Co., Manhattanville. In blast in 1872.

Napanock Furnace, Napanock, Ulster co.

Onondaga Iron Company, Geddes, Onondago co.

Ontario Furnace, Ontario, Clinton co. Altered from charcoal.

Peekskill Furnace, Peekskill Iron Co., Peekskill, Westchester co.

Port Henry Furnace, Port Henry Iron Co., Port Henry, Essex co.

Poughkeepsie Furnace, Beck & Tower, Poughkeepsie, Dutchess co.

Southfield Furnace, Sterling Iron and Railway Co., Southfield, Orange Co. In operation in 1872.

Sterling Furnace, Sterling Iron and Railway Co., Sterling, Orange co. In operation in 1872.

Siscoe Furnace, Champlain Iron and Furnace Co., Westport, Essex co. Furnace in ruins.

Tonawanda Furnaces, Niagara River Iron Co., Buffalo. Two stacks; built 1872. P. P. Pratt, President.

The Albany Manufacturing Co., Albany, are building two new stacks, each lined, 60x16, capacity 70 tons per day. To be in blast in 1873.

The Clinton Iron Company have commenced to build a furnace at Manchester, Ontario county, to be run with anthracite, and another at Kirkland, Oneida county, with fuel not stated. Theodore Avery is Secretary and Treasurer.

The Ithaca Iron Company, a new organization at Ithaca, Tompkins County, will put up a blast furnace during the summer of 1873.

CHARCOAL.

Alpina Furnace, Oxbow, Jefferson co.

Carthage Iron Co., Carthage Iron Co., Carthage, Jefferson co. One stack, 36 x 9; daily capacity 12 tons; in blast in 1872.

Chatham Furnace, Beckley & Adams, Chatham Four Corners, Columbia co. In course of erection.

Copake Iron Works, Frederick Miles, Copake, Columbia co. Two stacks.

Cooper's Falls Furnace, Union Iron Co. of Buffalo, De Kalb, St. Lawrence co. Built 1864; not in blast since December, 1868.

Clinton Furnace, Ontario, Wayne co. Abandoned.

Crown Point Iron Works, J. & T. Hammond & Co., Crown Point, Essex co. Burned down in 1872. Will not be rebuilt.

Dutchess County Iron Works, Dover, Dutchess co. Has not run for 2 years.

Fletcherville Furnace, Witherbee, Fletcher & Co., Moriah, Essex co. In blast in 1872; capacity daily 12 tons.

Greenwood Furnace, Peter P. Parrott, Greenwood Iron Works, Orange co. Not in blast in 1872. Only charcoal furnace in Southern New York or Northern New Jersey.

Hopewell Furnace, Hopewell, East Fishkill, Dutchess co.

Myers Steel and Iron Co., Clifton, St. Lawrence co.

Millerton Iron Co., Millerton Iron Co., Millerton Station, Dutchess co. Running in 1872.

Norwich Blast Furnace, Norwich, Chenango co.

Port Leyden Iron Co., Fort Leyden, Lewis co.

Phœnix Furnace, C. S. Maltby, Millerton, Dutchess co. Running in 1872.

Redwood Furnace, Redwood, Jefferson co.

Rossie Iron Works, Rossie Iron Co., Rossie, St. Lawrence co. In blast in 1872. Forty thousand tons of ore were used at the works.

Sterlingbush Furnace, Jefferson Iron Co., Sterlingbush, Lewis co. Cold blast; running in 1872.

Sterling Iron Ore Co., Sterling Iron Ore Co., Philadelphia, Jefferson co.

Sterlingville Furnace, Jefferson Iron Co., Sterlingville, Jefferson co. Cold blast; running in 1872.

Wassaic Iron Works, M. Gridley & Son, Wassaic, Dutchess co. In blast in 1872.

Wolcott Furnace, Wolcott Village, Wayne co.

The Jefferson Iron Company of Antwerp, New York, beside their furnaces at Sterlingbush and Sterlingville, have a forge at Antwerp. Their ore bed is also situated at the latter place.

NEW JERSEY.

ANTHRACITE FURNACES.

Andover Iron Works, Andover Iron Co., Phillipsburg, Warren co. Three stacks; in blast in 1872.

Boonton Iron Works, Fuller, Lord & Co., Boonton, Morris co. Two stacks; in blast in 1872.

Franklin Furnace, Franklin Iron Co., Franklin, Sussex co. Old charcoal furnace now dismantled, but the company is building an anthracite furnace to be 67 feet high, with 23 feet bosh, to be completed by July, 1873.

Musconetcong Iron Works, A. Pardee & Co., Stanhope, Sussex co. Two stacks; both in blast in 1872.

Oxford Iron Works, Oxford Iron Co., Oxford, Warren co. Two furnaces; both in blast in 1872; one 100 years old.

Port Oram Furnace, Port Oram Iron Co., Port Oram, Morris co. In blast in 1872.

Ringwood Furnace, Cooper, Hewitt & Co., New York, Ringwood, Passaic co. Two stacks; not in blast in 1872; one, recently altered from charcoal, went in blast in January, 1873, and the other will be altered to anthracite during the present year.

The Pequest Mining and Manufacturing Co. are building an anthracite furnace at Oxford, Warren co., to go into blast next year.

CHARCOAL FURNACES.

Wawayanda Furnace, Thomas Iron Co., Wawayanda, Sussex co. Not in blast in 1872; to be altered to anthracite.

Wynockie Furnace, Cooper, Hewitt & Co., N. Y., Wynockie, Passaic co. Abandoned.

PENNSYLVANIA.

LEHIGH VALLEY ANTHRACITE FURNACES.

Allentown Iron Works, Allentown Iron Co., Allentown, Lehigh co. 5 stacks.

Bethlehem Iron Works, Bethlehem Iron Co., Bethlehem, Northampton co. Three stacks; built in 1862, 1867 and 1868; all in blast in 1872. One new stack building; another contemplated.

Carbon Iron Works, Carbon Iron Co., Parryville, Carbon co. Three stacks; all in blast in 1872.

Coleraine Iron Works, W. T. Carter & Co., Coleraine Iron Co., Redington, Northampton co. Two stacks; one built in 1870, the other in 1873. Both in blast in 1872.

Durham Iron Works, Cooper & Hewitt, Riegelsville, Bucks co. Two stacks; in blast in 1872.

Easton Furnace, Uhler & Fulmer, Easton, Northampton co. One stack; in blast in 1872.

Emaus Furnace, Emaus Iron Co., Emaus, Lehigh co. Built in 1872.

Glendon Iron Works, Glendon Iron Co., Easton, Northampton co. 4 stacks.

Lehigh Crane Iron Works, Lehigh Crane Iron Co., Catasauqua, Lehigh co. Six stacks; all in blast in 1872.

Lehigh Iron Works, Lehigh Iron Co., Allentown, Lehigh co. Two stacks.

Lehigh Valley Furnaces, Lehigh Valley Iron Co., Coplay, Lehigh co. Three stacks; in blast in 1872.

Northampton Iron Works, Bethlehem, Northampton co. One stack; built in 1872; ready to go into blast.

North Penna. Furnace, North Penn. Iron Co., Bingen, Northampton co. One stack, 63 by 18; in blast in 1872.

Roberts Iron Works, Allentown Rolling Mill Co., Allentown, Lehigh co.

Saucon Iron Works, Saucon Iron Co., Hellertown, Northampton co. 2 stacks.

Thomas Iron Works, Thomas Iron Co., Alburtis, Lehigh co. Two stacks; in blast in 1872.

Thomas Iron Works, Thomas Iron Co., Hokendauqua, Lehigh co. Six stacks; four in blast in 1872; two built in 1872, soon to be put in blast.

SCHUYLKILL VALLEY ANTHRACITE FURNACES.

Edgehill Iron Works, Edgehill Iron Co., Edgehill, Montgomery co.

Hampton Furnace, E. & G. Brooke, Birdsboro, Berks co. Changed recently from charcoal to anthracite.

Henry Clay Furnaces, Eckert & Co., Reading, Berks co. Two stacks; in blast in 1872.

Keystone of Reading, Bushong, Merkel & Co., Reading, Berks co. Two furnaces; in blast in 1872; one built in 1872.

Keystone Furnaces, E. & G. Brooke, Birdsboro, Berks co. Three furnaces; two in blast in 1872; one built in 1872.

Leesport Furnace, Leesport Iron Co., Leesport, Berks co. In blast in 1872; one stack.

Lucinda Furnace, W. Schall & Sons, Norristown, Montgomery co. In blast in 1872; one stack.

Minersville Furnace, Minersville Iron Co., Minersville, Schuylkill co. In course of erection.

Monocacy Furnace, Wright, Cook & Co., Monocacy, Berks co. In blast in 1872; one stack.

Moselem Furnace, Bushong & Co., Nora, Berks co. In blast in 1872; one stack.

Mt. Laurel Furnace, W. H. Clymer & Co., Temple, Berks co. One stack; about changing from charcoal.

Merion Furnaces, J. B. Moorhead & Co., Conshohocken, Montgomery co. Two stacks; Merion Furnace, 40x12, built by the late Stephen Colwell in 1845; in blast in 1872; stone stack; Player hot blast. Elizabeth Furnace, 50x15, built by J. B. Moorhead in 1872; went in blast October 24, 1872; iron-cased stack; Ford hot blast; average heat produced by these ovens is 1000°. These furnaces are now producing about 350 tons of iron per week.

Montgomery Furnace, Montgomery Iron Co., Port Kennedy, Montgomery co.

Norristown Iron Works, James Hooven & Sons, Norristown, Montgomery co.

Pioneer Furnaces, Atkins & Bro., Pottsville, Schuylkill co. Three stacks; one built in 1872; two stacks in blast in 1872.

Pottstown Furnace, Pottstown Iron Co., Pottstown, Montgomery co

Phœnixville Furnaces, Phœnix Iron Co., Phœnixville, Chester co. Three stacks.

Plymouth Furnaces, S Fulton & Co., Conshohocken, Montgomery co.

Reading Furnaces, Seyfert, McManus & Co., Reading, Berks co. Two stacks; one built in 1872; one in operation in 1872.

Robesonia Furnaces, White & Ferguson, Robesonia, Berks co. Two stacks; in blast in 1872.

Ringgold Iron and Coal Co., Ringgold, Schuylkill co. In course of erection.

Schuylkill Iron Co., Port Carbon, Schuylkill co. In course of erection.

Spring Mill Furnaces, D. O. & H. S. Hitner, Conshohocken, Montgomery co.

St. Clair Furnace, James Lanigan, St. Clair, Schuylkill co.

Stephen Robbins & Son, Beach and Vienna streets, Philadelphia. Anthracite. One stack; now building; to be in blast in the summer of 1873.

Swede Furnaces, Reppller, Lanigan & Co., Norristown, Montgomery co.

Temple Furnace, Clymer, McHose & Co., Temple, Berks co. One stack; in blast in 1872. The firm intend to build another stack.

Wm. Penn Furnaces, D. O. & H. S. Hitner, Conshohocken, Montgomery co.

PROJECTED FURNACES.

Kutztown Furnace, Kutztown, Berks co.

Topton Furnace, Topton Iron Co., Topton, Berks co. L. H. Leiss, president.

Millerstown Iron Co., Reading, Berks co.

Warwick Iron Co., Pottstown, Montgomery co. This company own a rich mine of magnetic ore in Hereford township, Berks co., which they call "steel ore," and they propose to erect a furnace as soon as the Colebrookdale R. R. is extended to their ore fields.

UPPER SUSQUEHANNA ANTHRACITE FURNACES.

Bloom Iron Works, McKelvy & Neal, Bloomsburg, Columbia co.

Chulasky Furnace, Waterman & Beaver, Chulasky, Northumberland co.

Columbia Furnace, Grove Bros., Danville, Montour co.

Duncannon Furnace, J Wister & Co., Duncannon, Perry co.

Irondale Furnace, Bloomsburg Iron Co., Bloomsburg, Columbia co.

Jas. S. Marsh & Co., Northumberland, Northumberland co. In course of erection.

Juniata Furnace, The Williamsburg Manuf'g Co., Williamsburg, Blair co.

Lackawanna Iron Works, Lackawanna Iron & Coal Co., Scranton, Luzerne co. Five stacks; four in blast in 1872; one built in 1872.

Lewistown Furnaces, Glamorgan Iron Co., Lewistown, Mifflin co. Two stacks; one built 1853, in blast in 1872; one built in 1872, put in blast Dec., 1872.

Matilda Furnace, Mt. Union Iron Co., Mt. Union, Huntingdon co. Furnace in Wayne Township, Mifflin co.

National Iron Co., Hancock, Creveling & Co., Danville, Montour co.

Pennsylvania Iron Works, Waterman & Beaver, Danville, Montour co.

Shamokin Furnace, William Brown, Shamokin, Northumberland co.

Union Furnace, Beaver, Marsh & Co., Winfield, Union co.

LOWER SUSQUEHANNA ANTHRACITE FURNACES.

Aurora Furnace, Wrightsville Iron Co., Wrightsville, York co. One stack; in operation in 1872.

Baldwin Furnace, Penna. Steel Co., Steel Works P. O., Dauphin co. One stack; in course of erection. Will go into blast this summer.

Bird Coleman Furnace, R. W. Coleman's heirs, Cornwall, Lebanon co. One stack; built in 1872-3.

Cameron Furnace, Cameron Iron Co., Middletown, Dauphin co. One stack; in blast in 1872.

Chestnut Hill Furnaces, Chestnut Hill Iron Ore Co., Columbia, Lancaster co. Three stacks; in blast in 1872.

Chickies Furnace, E. Haldeman & Co., Chickies, Lancaster co. Two stacks; in blast in 1872.

Conestoga Furnace, Thomas & Peacock, Lancaster, Lancaster co. One stack; in blast in 1872.

Cornwall Anthracite Furnace, R. W. Coleman's Heirs & Co., Cornwall, Lebanon co. Two stacks; in blast in 1872.

Dauphin Furnace, Dr. Heck, Dauphin, Dauphin co. One stack; in blast in 1872.

Donaghmore Furnaces, R. W. Coleman's Heirs, Lebanon, Lebanon co. On stack in blast in 1872; one stack in course of erection.

Donegal Furnace, Myers & Benson, Marietta, addressed at Columbia, Lancaster co. One stack; in blast in 1872.

Harrisburg Furnace, Price Bros. & Sharp, Harrisburg, Dauphin co.

Henry Clay Furnace, Denny & Hess, Columbia, Lancaster co. One stack; in blast in 1872.

Kauffman Furnace, C. S. Kauffman, Columbia, Lancaster co. One stack; in blast in 1872.

Lebanon Valley Furnace, Meily Bros. & Nutting, Lebanon, Lebanon co.

Lebanon Furnaces, G. D. Coleman, Lebanon, Lebanon co. One stack in blast in 1872; one stack in course of erection; will go into blast this summer.

Lochiel Furnace, Lochiel Iron Co., Lochiel, Dauphin co. One stack, built 1872; in blast in April, 1873.

Marietta Furnaces, H. M. Watts & Sons, Marietta, Lancaster co. Two stacks; in blast in 1872.

Middletown Furnace, Meily & Nutting, Middletown, Dauphin co. One stack; in blast in 1872.

Musselman Furnace, H. Musselman & Sons, Marietta, Lancaster co. One stack in blast in 1872.

North Cornwall Furnace, Mrs. M. C. Freeman, North Cornwall, Lebanon co. One stack; in blast in 1872.

Paxton Furnaces, McCormick & Co., Harrisburg, Dauphin co. Two stacks; one in blast in 1872; one built in 1872.

Porter Furnace, Harrisburg, Dauphin co. Rebuilding.

Safe Harbor Furnace, Safe Harbor Iron Co., Safe Harbor, Lancaster co. Not in blast in 1872.

Sheridan Furnace, Wm. F. Kauffman & Co., Sheridan, Lebanon co. In blast in 1872.

Stanhope Furnace, Wynkoop Bros., Pine Grove, Schuylkill co. In blast in 1872.

St. Charles Furnace, C. B. Grubb & Son, Columbia, Lancaster co., addressed at Lancaster. One stack; in blast in 1872.

Union Deposit Furnace, Camden Rolling Mill Co., Union Deposit, Dauphin co.

Wister Furnace, J. & J. Wister, Harrisburg, Dauphin co.

PROJECTED.

Anthracite furnaces, of one stack each, are projected by C. B. Grubb & Son, and Columbia Steel and Iron Co., at Columbia, Lancaster co. The Reading Coal and Iron Company have leased the Carlisle Ironworks property for ninety-nine years, and purchased the Big Bond Furnace property and 6000 acres of land for $200,000.

SHENANGO VALLEY FURNACES—BITUMINOUS COAL OR COKE.

Allen Furnace, Henderson, Allen & Co., Sharpsville, Mercer co. One stack, 50 by 12, in blast in 1872; built 1870; annual capacity; 9000 tons.

Clara Furnace, Crowther Iron Co., New Castle, Lawrence co. Coke. One stack, 65 by 16; annual capacity, 12,000 tons; built in 1872; went in blast in May, 1872.

Douglass Furnaces, Pierce, Kelley & Co., Sharpsville, Mercer co. One stack, 50 by 12, built 1871, in blast in 1872. One stack, 50 by 14, built in 1872. Combined capacity, 20,000 tons.

Erie Furnace, Rawle, Noble & Co., Erie, Erie co. One stack, 50 by 12, built 1870; annual capacity, 9000 tons; in blast in 1872.

Etna Furnaces, Etna Iron Co., New Castle, Lawrence co. Two stacks, built 1868, each 50 by 12; combined annual capacity, 18,000 tons; in blast in 1872.

Homewood Furnace, James Wood & Co., Homewood, Beaver co.

Keel Ridge Furnace, Samuel Kimberly, Sharon, Mercer co. One stack, 50 by 14, built 1870; annual capacity, 11,000 tons; in blast in 1872.

Middlesex Furnace, Middlesex Furnace Co., Middlesex, Mercer co. 1 stack, 46 by 12; annual capacity, 6000 tons; in blast in 1872.

Mt. Hickory Furnace, Mt. Hickory Iron Co., Sharpsville, Mercer co. Two stacks, each 50 by 12; combined annual capacity, 18,000 tons; in blast in 1872. Both built in 1869.

Neshannock Furnace, Neshannock Iron Co., New Castle, Lawrence co. One stack, 60 by 14; annual capacity, 12,000 tons; built in 1872.

Onondago Furnace, Onondago Iron Co., New Castle, Lawrence co. 2 stacks in course of erection.

Ormsby Furnace, Ormsby Iron Co., Sharpsville, Mercer co. One stack, 50 by 12; annual capacity, 9000 tons; built in 1872.

Sharon Furnace, Boyce, Rawle & Co., Sharon, Mercer co. One stack, 46 by 11; annual capacity, 9000 tons; in blast in 1872.

Sharpsville Furnace, James Pierce & Son, Sharpsville, Mercer co. 1 stack, 50 by 11; annual capacity, 9000 tons; in blast in 1872.

Shenango Furnaces, Shenango Furnace Co., Middlesex, Mercer co. 2 stacks, each 46 by 10, built 1860; combined annual capacity, 17,000 tons; both in blast in 1872.

Shenango Iron Works, Reis, Brown & Berger, New Castle, Lawrence co. Two stacks, 50 by 14, and 35 by 8; in blast in 1872. One stack, 75 by 20, completed in 1872, went in blast in May, 1873; combined annual capacity, 40,000 tons.

Spearman Furnaces, Spearman Iron Co., Sharpsville, Mercer co. 2 stacks, each 50 by 14; combined annual capacity, 22,000 tons; one built in 1872, one now building.

Valley Furnaces, Stewart Iron Co., Sharon, Mercer co Two stacks, one 50 by 12, built 1870, in blast in 1872, and one 50 by 14, built in 1872; combined annual capacity, 20,000 tons.

Wampum Furnace, Wampum Furnace Co., Wampum, Lawrence co. One stack, 46 by 12; annual capacity, 9000 tons; in blast in 1872.

Westerman Furnaces, Westerman Iron Co., Sharon, Mercer co. Two stacks, built in 1865 and 1866, each 50 by 13; combined annual capacity, 18,000 tons; in blast in 1872.

Wheeler Furnace, Wheeler Iron Co., Middlesex, Mercer co. One stack, 50 by 12; annual capacity, 9000 tons; now building.

Wheatland Furnaces, James Wood's Sons & Co., Wheatland, Mercer co. Four stacks, built from 1860 to 1865, one 46 by 9, and three 46 by 12; in blast in 1872; combined annual capacity, 30,000 tons.

CHARCOAL FURNACES—BLAST STATE.

Augusta Furnace, Eagle & Co., Shippensburg, Cumberland co. Abandoned.

Bald Eagle Furnace, Lyon, Shorb & Co., Pittsburgh, Pa. Furnace near Tyrone, Blair co.

Barree Furnace, G. Dorsey, Green & Co., Barree Forge, Huntingdon co.

Bellefonte Furnace, Valentine & Co., Bellefonte, Center co.

Bloomfield Furnace, Ricketson & Co., Bloomfield, Bedford co.

Buffalo Furnaces, Graff & Painter, Armstrong co. Abandoned.

Caledonia Furnace, Thaddeus Stevens estate, Graeffenburg, Adams co. Not in blast in 1872; furnace in Franklin co.

Carlisle Furnace, Ahl & Bro., Boiling Springs, Cumberland co.

Charcoal Furnace, Foltz, Jordan & Co., New Castle, Lawrence co. One stack.

Carrick Furnace, Fannettsburg, Franklin co.

Chestnut Grove Furnace, Ahl & Bro., Idaville, Adams co.

Cornwall Furnace, R. W. Coleman's Heirs & Co., Cornwall, Lebanon co. In blast in 1872; one stack.

Cumberland Furnace, Ahl & Bro., Dickinson. Cumberland co. Out of blast for many years; recently purchased by Ahl & Bro., who intend to operate the mines in its vicinity and perhaps fit up the furnace.

Eagle Furnace, C. R. & J. Curtin, Milesburg, Center co.

East Penn Furnace, John Balliet, Parryville, Carbon co. In blast in 1872.

Emma Furnace, Logan Iron and Steel Co., Logan, Mifflin co.

Etna Furnace, Samuel Isett, Yellow Springs, Blair co.

Fair Chance Furnace, F. H. Oliphant, Uniontown, Fayette co. Built in 1794; owned by Thompson & Co.; in blast in 1872.

Franklin Furnace, Hunter & Springer, St. Thomas, Franklin co. In blast in 1872.

Greenwood Furnace, Logan Iron and Steel Co., Greenwood Furnace, Huntingdon co. Two stacks.

Hecla Furnace, McCoy & Linn, Milesburg, Center co.

Hopewell Furnace, Eichelberger & Co., Hopewell, Bedford co.

Howard Furnace, Lauth, Thomas & Co., Howard, Center co. Undergoing repairs in 1872; to be put in blast in 1873.

Hope Furnace, Jos. S. Brown & Co., Rose Point, Lawrence co. In blast in 1872.

Huntingdon Furnace, G. & J. H. Shoenberger, Spruce Creek, Huntingdon co.

Isabella Furnace, Smith & Bro., Barneston, Chester co.

Indiana Furnace, S. C. Baker, Altoona, Blair co. Not in blast in 1872. Furnace in Indiana co.

Jefferson Furnace, John M. Kaufman & Bro., Auburn, Schuylkill co. In blast in 1872.

Joanna Furnace, L. B. Smith & Co., Joanna, Berks co. In blast in 1872.

Lehigh Furnace, Hewitt & Balliet, Lehigh Furnace, Lehigh co.

Madison Furnace, Lyon, Shorb & Co., Clarion, Clarion co. Abandoned in 1872.

Maiden Creek Furnace, Heirs of Geo. Merkle, Lenhartsville, Berks co. In blast in 1872.

Manada Furnace, Bland, Grubb & Co., West Hanover, Dauphin co.

Margaretta Furnace, Thos. Himes, Margaretta, York co.

Mary Ann Furnace, Horatio Trexler, Long Swamp, Berks co. Not in blast for several years and not likely to be started again.

Martha Furnace, H. McNeal, Spang's Mills, Blair co.

Mill Creek Furnace, Edw. A. Green & Co., Mill Creek, Huntingdon co.

Mont Alto Furnace, Mont Alto Iron Co., Mont Alto, Franklin co. One stack, 37x9; in blast in 1872; bloom forge connected with the furnace.

Mount Hope Furnace, A. B. Grubb, Mount Hope, Lancaster co.

Mount Penn Furnace, Huntzinger & Co., Reading, Berks co. In blast in 1872.

Mt. Pleasant Iron Works, Ahl & Brother, London, Franklin co.

Oley Furnace, W. H. Clymer & Co., Temple, Berks co. One stack; in blast in 1872. This stack was built in 1772.

Paradise Furnace, H. Tranler, Reading, Berks co.

Pennsylvania Furnace, Lyon, Shorb & Co., Rock Spring, Huntingdon co.

Pike Furnace, Hunter Orr, Lawsonham, Clarion co. Abandoned.

Pine Grove Furnace, South Mountain Iron Co., Pine Grove Works, Cumberland co.

Rebecca Furnace, Loranz & Leamer, Martinsburg, Blair co.

Rodman Furnace, Ricketson & Co., Spang's Mill, Blair co.

Sally Ann Furnace, Daniel S. Hunter, Bowers Station, Berks co. Not in blast for several years and not likely to be started again.

Sarah Furnace, D. C. McCormick, Sarah, Blair co.

Springfield Furnace, John Boyce, Springfield Furnace, Blair co.

Spring Hill Furnace, Oliphant & Duncan, Smithfield, Fayette co.

York Furnace, John Blair & Co., York Furnace, York co.

RAW BITUMINOUS COAL OR COKE FURNACES—STATE.

Allegheny Furnaces, S. C. Baker, Altoona, Blair co. Coke. In blast in 1872.

Bennington Furnace, Blair Iron and Coal Co., Bennington Furnace, Blair co. Coke. In blast in 1872.

Blair Iron and Coal Co.'s Furnaces, Blair Iron and Coal Co., Hollidaysburg, Blair co. Coke. Two stacks; in blast in 1872.

Brady's Bend Furnace, Brady's Bend Iron Co., Brady's Bend, Armstrong co.

Cambria Iron Works, Cambria Iron Co., Johnstown, Cambria co. Coke. Four stacks at Johnstown, three of which were in blast in 1872; one stack at Conemaugh Station, in blast in 1872. A large furnace is now building at Johnstown; will probably go in blast in the fall of 1873.

Clinton Furnace, Graff, Bennett & Co., Pittsburgh, Allegheny co.

Dunbar Iron Works, Dunbar Iron Co., Dunbar, Fayette co. One stack; average daily run, 50 tons; in blast in 1872.

Eliza Furnaces, Laughlins & Co., Pittsburgh, Allegheny co. Two stacks.

Elizabeth Furnace, Martin Bell & Co., Sabbath Rest, Blair co. Coke. Went into blast in fall of 1872, after a long rest.

Frankstown Furnace, Blair Iron and Coal Co., Frankstown, Blair co. Coke. Rebuilt in 1872 and put in blast on Nov. 1, 1872.

Howard Furnace, Lauth, Thomas & Co., Howard, Center co. Coke. Undergoing repairs in 1872; to be put in blast in 1873.

Isabella Furnaces, Isabella Furnace Co., Pittsburgh, Allegheny co. 2 stacks; one 75 by 18, and the other 75 by 20.

Kemble Furnaces, Kemble Coal and Iron Co., Riddlesburg, Bedford co. 2 stacks; in blast in 1872.

Lucy Furnace, Klomen & Carnegie Bros., Pittsburgh, Allegheny co. One stack, 75 by 19.

Mahoning Furnace, J. A. Colwell & Co., Kittanning, Armstrong co.

Marshall furnace, Newport, Perry co. Not in blast in 1872; started anew in 1873 under new management.

Monticello Furnace, McKnight, Porter & Co., Monticello, Armstrong co.

Pine Creek Furnace, Brown & Musgrove, Kittanning, Armstrong co.

Red Bank Furnace, Reynolds & Moorhead, Red Bank Furnace, Clarion co. Coke. Built 1860; in blast in 1872.

Sarah Furnace, R. Jennings & Co., Catfish, Clarion co.

Sligo Furnace, Lyon, Shorb & Co., Clarion, Clarion co. Coke. Not in blast in 1872.

Shoenberger Furnaces, W. H. Shoenberger & Blair, Pittsburgh, Allegheny co. Three stacks.

Soho Furnace, Moorhead & Co., Pittsburgh, Allegheny co. One stack 75 by 19.

Stewardson Furnace, F. B. & A. Laughlin, Orrsville, Armstrong co. Coke. In blast in 1872.

Superior Furnaces, Harbaugh, Mathais & Owens, Woods Run, Allegheny co. Two stacks.

PROJECTED.

Rock Hill Iron and Coal Co., Huntingdon co. Coke. Two stacks contemplated.

OHIO.

HANGING ROCK FURNACES—CHARCOAL.

Antwerp Furnace, Antwerp Furnace Co., Antwerp, Paulding co.

Bloom Furnace, John Paull & Co., Bloom Station, Scioto co. In blast in 1872.

Buckeye Furnace, Buckeye Furnace Co., Berlin X Roads, Jackson co. In blast in 1872; hot blast.

Buckhorn Furnace, Charcoal Iron Co., Ironton, Lawrence co. In blast in 1872.

Centre Furnace, W. D. Kelly & Sons, Ironton, Lawrence co. In blast in 1872.

Cambria Furnace, David Lewis & Co., Sampsonville, Jackson co. In blast in 1872; hot blast.

Clinton Furnace, W. J. Bell, Wheelersburg, Scioto co. In blast in 1872.

Diamond Furnace, Jackson, Jackson co. Abandoned and wrecked.

Eagle Furnace, L. C. Damarin & Co., Reed's Mills, Vinton co. Not in blast in 1872.

Etna Furnace, Etna Iron Works, Ironton, Lawrence co. In blast in 1872.

Empire Furnace, Jas. Forsythe & Co., Franklin Furnace, Scioto co. Abandoned and wrecked.

Franklin Furnace, O. B. Gould, Franklin Furnace Scioto co. Abandoned.

Grant Furnace, W. D. Kelly & Sons, Ironton, Lawrence co. In blast in 1872.

Gallia Furnace, Norton, Campbell & Co., Portsmouth, Scioto co. In blast in 1872; furnace in Gallia co.

Hamden Furnace, Hamden Furnace Co., Portsmouth, Scioto co. In blast in 1872; furnace in Vinton co.

Hecla Furnace, Hecla Iron and Mining Co., Ironton, Lawrence co. In blast in 1872; cold blast.

Harrison Furnace, Harrison Furnace Co., Sciotoville, Scioto co. Abandoned and wrecked.

Hocking Furnace, Hocking co. Abandoned.

Hope Furnace, Hope Furnace Co., Hope Furnace, Vinton co. L. C. Damarin, lessee; not in blast in 1872.

Howard Furnace, Charcoal Iron Company, Ironton, Lawrence co. In blast in 1872; furnace in Scioto co.

Jackson Furnace, Jackson Furnace Co., Iron Furnace, Scioto co. In blast in 1872; furnace in Jackson co.

Jefferson Furnace, Jefferson Furnace Co., Oak Hill, Jackson co. In blast in 1872; cold blast.

Junior Furnace, O. B. Gould, Franklin Furnace, Scioto co. Abandoned and wrecked.

Keystone Furnace, Keystone Furnace Co., Key-

stone Furnace, Jackson co. In blast in 1872; addressed also at Portsmouth.
Lawrence Furnace, Lawrence Furnace Co., Ironton, Lawrence co. In blast in 1872.
Latrobe Furnace, Bundy & Cobb, Berlin X Roads, Jackson co. In blast in 1872; hot blast.
Limestone Furnace, Portsmouth, Scioto co. Abandoned and wrecked.
Lincoln Furnace, Lincoln Furnace Co., Reed's Mills, Vinton co. In blast in 1872; hot and cold blast.
Logan Furnace, Logan Iron Co., Logan, Hocking co. In blast in 1872.
Lagrange Furnace, Means, Kyle & Co., Hanging Rock & Cincinnati. Abandoned and wrecked.
Monitor Furnace, Monitor Furnace Co., Ironton, Lawrence co. Cold blast; in blast in 1872.
Madison Furnace, Clare, Duduit & Co., Clay, Jackson co. In blast in 1872; hot blast.
Monroe Furnace, Union Iron Co., Portsmouth, Scioto co. In blast in 1872; hot blast; furnace in Jackson co.
Mount Vernon Furnace, H. Campbell & Co., Ironton, Lawrence co. In blast in 1872.
Morgan Furnace, Morgan Coal and Iron Co., Irondale, Jefferson co. In blast in 1872.
Olive Furnace, Campbell, McGugin & Co., Ironton, Lawrence co. In blast in 1872.
Ohio Furnace, Means, Kyle & Co., Hanging Rock, Lawrence co. In blast in 1872; furnace in Scioto co.
Oak Ridge Furnace, Bank of Ashland, Ironton, Lawrence co. Abandoned and wrecked.
Pine Grove Furnace, Means, Kyle & Co., Hanging Rock, Lawrence co. In blast in 1872.
Pioneer Furnace, Rogers & Swap, Hale's Creek, Scioto co. Abandoned and wrecked.
Richland Furnace, Richland Furnace Co., Richland, Vinton co. In blast in 1872; hot blast.
Scioto Furnace, L. C. Robinson & Co., Portsmouth, Scioto co. In blast in 1872.
Sandy Furnace, Means & Patton, Hanging Rock, Lawrence co. Abandoned.
Union Furnace, Brooks & Houston, Logan, Hocking co. Built in 1853; not in blast in 1872.
Vesuvius Furnace, Etna Iron Works, Ironton, Lawrence co. In blast in 1872.
Washington Furnace, Union Iron Co., Portsmouth, Scioto co. In blast in 1872; furnace in Lawrence co.
Zaleski Furnace, Zaleski Furnace Co., Zaleski, Vinton co. Abandoned and wrecked.

BITUMINOUS.

Bellair Nail Works, Bellair, Belmont co. In course of erection; to be 16 ft. bosh.
Belmont Furnaces, Belmont Nail Works, Martin's Ferry, Belmont co. In blast in 1872.
Benwood Iron Works, Wheeling, W. Va. Furnace, at Martinsville, Ohio. In blast in 1872; Nail Works, at Benwood, W. Va.
Belfont Furnace, Belfont Iron Works, Ironton, Lawrence co. One stack, 70 by 16; in blast in 1872.
Buffalo Furnace, G. T. Stedman, Cincinnati.
Fulton Furnace, Fulton Furnace Co., Jackson, Jackson co. In blast in 1872.
Globe Furnace, Watts, Hoop & Co., Jackson, Jackson co. Built in 1872; hot blast.
Ironton Mill, Ironton Steel and Iron Co., Ironton, Lawrence co. In course of erection.
Orange Furnace, T. I. Fallis, Trustee, Jackson, Jackson co. In blast in 1872; hot blast.
Star Furnace, Star Furnace Co., Jackson, Jackson co. In blast in 1872; hot blast.
Steubenville Furnace, Steubenville Furnace and Iron Co., Steubenville, Jefferson co. Built in 1872; another projected.
Vinton Furnace, Vinton Furnace and Coal Co., Vinton, Vinton co. In blast in 1872.
Zanesville Furnace, Ohio Iron Co., Zanesville, Muskingum co. Two stacks; in blast in 1872.

COKE.

Jefferson Iron Works, Spaulding, Woodward & Co., Steubenville, Jefferson co. In blast in 1872; two stacks.
Mingo Furnace, Mingo Furnace Co., Mingo, Jefferson co. Two stacks; one built in 1872; one in blast in 1871.

PROJECTED FURNACES—BITUMINOUS.

Tropic Furnace, Tropic Furnace Co., Jackson, Jackson co. In course of erection; expected to be in operation by Sept., 1873.
Triumph Furnace, Triumph Furnace Co., Jackson, Jackson co. In course of erection; expected to be in operation by Sept., 1873.
Etna Iron Works, Ironton, Lawrence co.
Ironton Railway Mill, Ironton, Lawrence co. Will be in blast in Oct., 1873.

MAHONING VALLEY FURNACES—BITUMINOUS.

Akron Furnace, Akron Iron Co., Akron, Summit co. Built in 1872; went in blast in April, 1873.
Anna Furnace, Struthers Iron Co., Struthers, Mahoning co. In blast in 1872; one stack.
Ashland Furnaces, Jonathan Warner, Mineral Ridge, Trumbull co. Two stacks; in blast in 1872.
Ada Furnaces, Mahoning Iron Co., Lowellville, Mahoning co. In blast in 1872; one stack.
Briar Hill Furnace, Briar Hill Iron and Coal Co., Youngstown, Mahoning co. One stack; in blast in 1872.
Eagle Furnace, Cartwright, McCurdy & Co., Youngstown, Mahoning co. One stack; in blast in 1872.
Falcon Furnace, Brown, Bonnell & Co., Youngstown, Mahoning co. One stack; in blast in 1872.
Girard Furnace, Girard Iron Co., Girard, Trumbull co. In blast in 1872; one stack.
Grace Furnaces, Briar Hill Iron and Coal Co., Youngstown, Mahoning co. Two stacks; in blast in 1872.
Grafton Furnace, Grafton Furnace Co., Leetonia, Columbiana co. Two stacks; in blast in 1872.
Hubbard Furnaces, Andrews & Hitchcock, Youngstown, Mahoning co. Two stacks; one in blast in 1872, and one built in 1872.
Himrod Furnaces, Himrod Furnace Co., Youngstown, Mahoning co. Three stacks; in blast in 1872.
Hazelton Furnace, Andrews Brothers, Hazelton, Mahoning co. Two stacks; in blast in 1872.
James Ward & Co., Niles, Trumbull co. One stack; in blast in 1872.
Leetonia Furnace, Leetonia Iron and Coal Company, Leetonia, Columbiana co. Two stacks; in blast in 1872.
Massillon Furnace, J. P. Burton, Massillon, Stark co. In blast in 1872.
Phenix Furnace, Brown, Bonnell & Co., Youngstown, Mahoning co. One stack; in blast in 1872.
Tuscarawas Furnace, Tuscarawas Iron and Coal Co., Canal Dover, Tuscarawas co. In blast in 1872.
Volcano Furnace, Volcano Furnace Co., Massillon, Stark Co. In blast in 1872.
Warren Furnace, Wm. Richards & Sons, Warren, Trumbull co. In blast in 1872; one stack.
Wm. Ward & Co., Niles, Trumbull co. One stack; in blast in 1872.

BITUMINOUS COAL AND COKE.

Columbus Iron Co., Columbus Iron Co., Columbus, Franklin co. One stack, built 1869; in blast in 1872; capacity 38 tons.
Franklin Iron Co., Franklin Iron Co., Columbus, Franklin co. In course of erection; to be completed about Sept., 1873; capacity 50 tons.
Glasgow Furnace, Glasgow and Port Washington Coal and Iron Co., Port Washington, Tuscarawas co. In course of erection.
Port Washington Furnace, Glasgow and Port Washington Coal and Iron Co., Port Washington, Tuscarawas co. In course of erection.

CLEVELAND AND MISCELLANEOUS.

Cleveland Iron Manufacturing Co., Cleveland Iron Manufacturing Co., Cleveland, Cuyahoga co.
Cleveland Iron and Nail Co., Cleveland Iron and Nail Co., Cleveland, Cuyahoga co.
Newburg Furnace, Cleveland Rolling Mill Co., Cleveland. Bitumious. One furnace in blast in 1872; and one built in 1872, went into blast in November, 1872.
Union Iron Works, Union Iron Co., Newburg, Cuyahoga co. Bituminous. Built 1872.

PROJECTED.

Lake Erie Iron Co., Cleveland, Cuyahoga co.

INDIANA.

RAW BITUMINOUS BLOCK COAL.

Brazil Furnace, Yandes, Root & Garlick, Brazil, Clay co. One stack; in blast in 1872.
Lafayette Furnace, B. F. Maston & Co., Brazil, Clay co. One stack; in blast in 1872.
Otter Creek Block Coal Co., Brazil, Clay co. One stack; in blast in 1872.
Planet Furnace, Indianapolis Rolling Mill Co., Harmony, Clay co. In blast in 1872.
Southern Indiana Coal and Iron Manufacturing Co., Brazil, Clay co. One stack; in blast in 1872.
Vigo Furnaces, Vigo Iron Co., Terre Haute, Vigo co. Two stacks; one, daily capacity, 25 tons, in blast in 1872; one built in 1872.
Western Furnaces, Western Iron Co., Knightsville, Clay co. Two stacks; in blast in 1872.

PROJECTED FURNACES.

A furnace is projected at Shoals, Martin co. Raw bituminous block coal.

ILLINOIS.

Grand Tower Furnaces, Grand Tower Mining and Transportation Co., Grand Tower, Jackson co.
Joliet Iron and Steel Works, Joliet Iron and Steel Co., Joliet, Will co. Bituminous coal and coke. Two stacks, each 56 by 13, weekly capacity, 350 tons at Chicago, Cook co.; two stacks building at Joliet, 20 ft. bosh, each.
North Chicago Iron Works, North Chicago Iron Co., Chicago, Cook co. Bituminous coal and coke. Two stacks; in blast in 1872.

MICHIGAN.

CHARCOAL FURNACES.

Bancroft Furnace, built 1860, Bancroft Iron Co., Marquette, Marquette co. One stack stone and iron; in blast in 1872; water power.
Bangor Furnace, built 1872, Bangor Iron Co., Bangor, Van Buren co. In blast in 1873.
Bay Furnaces, built 1870 and 1872, Bay Furnace Co. Onota, Schoolcraft co. Two stacks; one in blast in 1872; one completed and went into blast in December, 1872.
Carp Furnace, built 1872, Carp Iron Co., Marquette, Marquette co. To be put in blast in 1873.
Champion Furnace, built 1867, Morgan Iron Co., Champion, Marquette co., P. O. Marquette. In blast in 1872.
Cascade Furnace, built in 1872, Cascade Iron Co., Escanaba, Delta co. One stack, not in blast in 1872.
Cliffs Furnace, Iron Cliffs Co., Negaunee, Marquette co. In course of erection.
Collins Furnace, built 1858, Collins Iron Co., Marquette, Marquette co. One of the oldest furnaces in Lake Superior region. In blast in 1872; water power.
Colwell Furnace, Menomonee Iron Co., Menomonee, Menomonee co. Charcoal made from pine slabs from the lumber mills. In course of erection.
Deer Lake Furnace, built 1868, Deer Lake Iron and Lumber Co., Ishpeming, Marquette co. Injured by fire in 1872. In blast part of the year; water power; another stack projected.
Detroit and Lake Superior Iron Manufacturing Co., Detroit, Wayne co. One stone stack, in blast in 1872.
Elk Rapids Furnace, Elk Rapids Iron Co., Elk Rapids, Antrim co. In course of erection; daily capacity, 25 tons.
Escanaba Furnace, built 1872, Escanaba Furnace Co., Escanaba, Delta co. Went in blast Feb., 1873.
Eureka Furnace, Eureka Iron Co., Wyandotte, Wayne co. One stack; in blast in 1872.
Frankfort Furnace, Frankfort Iron Co., Frankfort, Benzie co. One iron stack in blast in 1872; a stone stack in course of erection.
Greenwood Furnace, built 1865, Michigan Iron Co., Greenwood, Marquette co. In blast in 1872.
Jackson Furnaces, built 1867 and 1870, Jackson Iron Co., Fayette, Delta co. Two stacks; in blast in 1872.
John Burt, Marquette co. One stack; completed in June, 1873.
Lawton Furnace, Lawton Furnace Co., Lawton, Van Buren co. One stack; in blast in 1872.
Leland Furnace, E. B. Ward & Co., Leland, Leelenaw co. One brick stack; water power; in blast in the fall of 1872.
Michigan Furnace, built 1866, Michigan Iron Co., Clarksburgh, Marquette co. In blast in 1872.
Michigan Central Iron Co., Lawton, Van Buren co.
Morgan Furnace, built 1863, Morgan Iron Co., Morgan, Marquette co. P. O. Marquette. In blast in 1872.
Northern Furnace, built 1860, Northern Iron Co., Harvey, Marquette co. Not in blast in 1872; changing to anthracite.
Peninsular Iron Co., Detroit, Wayne co. One stone stack; in blast in 1872.
Pigeon River Iron Co., Saginaw, Saginaw co.
Pioneer Furnace, built 1857, Iron Cliffs Co., Negaunee, Marquette co. Two stacks.
Schoolcraft Furnace, built 1867, Schoolcraft Iron Co., Munissing, Schoolcraft co. In blast in 1872.
E. B. Ward & Co., Detroit, Wayne co. One stack; in blast in 1872.

BITUMINOUS COAL AND COKE FURNACES.

Hamtramck Furnace, Hamtramck Iron Co., Detroit, Wayne co. One iron stack; in blast four months in 1872.
Marquette and Pacific Furnace, built 1868, Marquette and Pacific Rolling Mill Co., Marquette, Marquette co. In blast in 1872; furnace now undergoing extensive repairs.
Union Iron Co., built 1872, Detroit, Wayne co. Used coal in 1872, but charcoal in 1873; one stack.

ANTHRACITE FURNACES.

Grace Furnace, built 1872, Lake Superior Iron Co., Marquette, Marquette co. Went in blast in December, 1872; one stack.

PEAT FURNACE.

Peat Furnace, built 1872, Lake Superior Iron Co., Ishpeming, Marquette co.

PROJECTED FURNACES—CHARCOAL.

Cascade Iron Co., Escanaba, Delta co. One stack.
Champion Iron Co., Marquette, Marquette co.
Cleveland Iron Mining Co., Marquette, Marquette co.
Deer Lake Iron and Lumber Co., Ishpeming, Marquette co. One stack, 9x45, iron shell, building.
Schoolcraft Iron Co., Munissing, Schoolcraft co. One stack.
Washington Co., Marquette, Marquette co.

WISCONSIN.

CHARCOAL FURNACES.

Appleton Iron Co., Appleton, Outagamie co. Two stacks; one built in 1871; in blast in 1872; one building; about completed.
Fond du lac Furnace, C. L. Meyers, Fond du Lac, Fond du Lac co. One stack building, nearly completed.
Fox River Iron Co., Depere, Brown co. Two stacks; one in blast in 1872; one built in 1872, went in blast in Jan., 1873.
Green Bay Iron Co., Green Bay, Brown co. One stack; built 1871; in blast in 1872.
National Iron Co., Depere, Brown co. Two stacks; one built 1871; in blast in 1872. One built in 1872; went in blast in March, 1873.
North Western Iron Co., Mayville, Dodge co. One stack; rebuilt in 1872; in blast 5 months in 1872; weekly production, 100 tons of iron.
Smith's Furnace, Ironton, Sauk Co. J. F. Smith. One stack, in blast in 1872.
Wisconsin Iron Co., Iron Ridge, Dodge co. One stack; built, 1856; in blast in 1872.

ANTHRACITE COAL OR COKE.

Milwaukee Iron Co., Bay View, Milwaukee co., P. O. Milwaukee. One-half anthracite coal and one-half coke. Two stacks; built in 1870 and 1871; in blast in 1872. Total production in 1872, 33,000 tons.
Minerva Furnace Co., Milwaukee, Milwaukee co. One stack, 55 by 15, now building; to be completed in June, 1873.
Five years ago Wisconsin had but three blast furnaces; now there are fourteen. The pig iron production of the State in 1872 was about 67,600 tons, and the new furnaces now building will probably bring this year's yield up to 100,000 tons.

MISSOURI.

BITUMINOUS COAL OR COKE.

Missouri Furnaces, built 1870. Missouri Furnace Co., St. Louis, St. Louis co. Two stacks; one in blast 32 weeks in 1872; the other in blast the whole year.
Pioneer Furnace, built 1863, Carondelet Iron Works, St. Louis, St. Louis co. One stack; in blast in 1872.
South St. Louis Furnaces, built 1870 and 1872, South St. Louis Iron Co., St. Louis, St. Louis co. Two stacks; No. 1 in blast 10 months in 1872, No. 2, 4 months.
Vulcan Furnaces, built 1869 and 1873, Vulcan Iron Works, St. Louis, St. Louis co. Two stacks in blast in 1872; one finished in 1873, which is expected to make 75 tons daily.

CHARCOAL.

Irondale Furnaces, E. Harrison & Co. Irondale, Washington co. In blast in 1872.
Iron Mountain Furnaces, built 1846 and 1850, Iron Mountain Furnace Co., Iron Mountain, St. Francois co. Two stacks; one in blast 12 months in 1872; one in blast only 6 months.
Maramec Furnace, built 1830, Maramec Iron Works, St. James, Phelps co. One stack; in blast in 1872.
Moselle Furnace, J. H. Brown & Co., Moselle, Franklin co. In blast 6 months in 1872; one stack.
Osage Furnace, built 1873, Osage Furnace Co., Lynn Creek, Camden co. One stack went in blast in April, 1873.
Pilot Knob Furnace, built 1848, Pilot Knob Iron Co., Pilot Knob, Iron co. Went into blast in May, 1872.
Scotia Iron Furnace, built 1870, Scotia Iron Works, Leasburg, Crawford co. In blast in 1872; one stack; hot and cold blast; office at St. Louis.

PROJECTED FURNACES.

Garrisons, Chouteau & Hart, St. Louis, St. Louis co. Two stacks; one nearly finished, 75x20, expected to turn out 75 tons daily.
Hamilton Furnace, Hamilton Furnace Co., Sullivan, Franklin co. One stack; hot blast; foundation laid in spring of 1873.
Ozark Furnace, Wm. James & Co., Ozark, Phelps co. Hot blast.
Cape Girardeau, Cape Girardeau co. Two stacks.
Campbell & Condec, Lynn Creek, Camden co.
Scott & Co., Morgan co.
The production of pig iron in Missouri in 1872 was about 125,000 tons. This will be increased in 1873, it is estimated, to at least 150,000 tons.

MARYLAND.

CHARCOAL FURNACES.

Catoctin Furnaces, J. B. Kunkel, Catoctin Furnaces, Frederick co. Two stacks; in blast in 1872.
Cedar Point Furnace, Brooke & Fritz, Baltimore, Baltimore co. One stack; in blast in 1872.
Chesapeake Furnace, W. F. Pannell, Baltimore, Baltimore co. One stack; in blast in 1872.
Green Spring Furnace, Whitson & Haines, Clear Spring, Washington co.
Harford Furnace, Clement, Dietrich & Sons, Harford Furnaces, Harford co. One stack; in blast in 1872.
Laurel Furnace, Daniel M. Reese, Baltimore, Baltimore co. One stack; in blast in 1872.
La Grange Furnace, Rogers & Moore, Clermont Hills, Harford co. One stack; in blast part of 1872.
Lazaretto Furnace, Stickney Iron Co., Baltimore, Baltimore co. One stack; in blast in 1872.
Locust Grove Furnace, Sinsheimer & Co., Stemmer's Run, Baltimore co. One stack; in blast in 1872.
Muirkirk Furnace, Muirkirk Iron Co., Muirkirk, Prince George's co. One stack; in blast in 1872.
Maryland Furnaces, Wm. Henry Ellicott, Baltimore, Baltimore co. Two stacks; in blast in 1872.
Principio Furnace, Geo. P. Whittaker, Principio, Cecil co. One stack; in blast in 1872.

ANTHRACITE FURNACES.

Ashland Furnace, Ashland Iron Co., Ashland, Baltimore co., Cockeysville, P. O. Three stacks; in blast in 1872.
Cedar Point Furnace, Brooke & Fritz, Baltimore, Baltimore co. One stack; in blast in 1872.
Havre Iron Co., Havre de Grace, Harford co. Two stacks; not in blast in 1872.

BITUMINOUS COAL AND COKE FURNACES.

Antietam Furnace, J. S. Ahl & Co., Sharpsburgh, Washington co. One stack; in blast in 1872. This furnace is for sale.
Bowery Furnace, Consolidation Coal Co., Frostburg, Alleghany co. One stack; in blast in 1872.
Elk Ridge Furnace, W. Brown, Elk Ridge Landing, Howard co. One stack; in blast in 1872.
Knoxville Furnace, C. S. Maltby, Knoxville, Frederick co. One stack; not in blast for several years, but will resume in 1873; formerly Longacoming Furnace.
Lonaconing Furnace, Lonaconing, Alleghany co. Abandoned.
Mount Savage Furnace, Union Mining Co., Mount Savage, Alleghany co. Two stacks; not in blast in 1872; a third stack commenced but never completed.

PROJECTED.

Baltimore and Ohio R. R. Co., Cumberland, Alleghany co. One or two stacks.

VIRGINIA.

CHARCOAL FURNACES.

Amherst Furnace, Wm. H. Jordan, Big Island, Bedford co. Built in 1872.
Boyers' Furnace, Wm. Boyers, Waterlick Station, Warren co. In blast in 1872.
Brown Hill Furnace, Brown Hill Iron Co., Wytheville, Wythe co. In blast in 1872.
Buena Vista Furnace, built 1847, Samuel F. Jordan, Buena Vista, Rockbridge co. Burned.
Buffalo Gap Iron and Steel Works, Buffalo Gap Furnace, Augusta co. One stack blown in February 1, 1873; another stack, 11 feet bosh, to go in blast in July, 1873, is now building; capacity of both, 20 tons per day.
Columbia Furnace, John Trippler & Son, Columbia, Shenandoah co. In blast in 1872.
Eagle Iron Works, built 1872, Benj. Gallup, Wytheville, Wythe co. In blast in 1872.
Elizabeth Furnace, Forrer & Dunlap, Stanton, Augusta co. In blast in 1872.
Glenwood Furnace, F. T. Anderson, Lexington, Rockbridge co. Not in blast in 1872.
Graham's Furnace, Graham & Robinson, Graham's Forge, Wythe co. In blast in 1872.
Holland Iron Works; Edward Shelley, Manager, Wytheville, Wythe co. Building.
Kennedy Furnace, L. Shaw, Waynesboro, Augusta co.
Liberty Furnace, B. P. Newman, Liberty Furnace, Shenandoah co. In blast in 1872.
Lucy Salina Furnace, Longdale Iron Co., Longdale, Allegheny co. In blast in 1872.
Mount Hope Furnace, Oglesby & Sayers, Wytheville, Wythe co. Not completed.
Mount Torrey Furnace, Mount Torrey Iron Co., Mount Torrey Works, Augusta co. In blast in 1872.
New Furnace, Graham & Robinson, Max Meadows, Wythe co. Building.
Oxford Iron Works, D. W. Moore, Lynchburg.
Page County Iron Works, Wm. Milnes, Luray, Page co. In blast in 1872.
Powhatan Furnace, Powhatan Iron Co., Richmond. Gen. Bartlett, Manager. In blast in 1873.
Providence Iron Works, I. Ireland, Manager, Speedwell, Wythe co. Building.
Radford Iron Co., Dublin, Pulaski co. In blast in 1872.
Ravens Cliff Furnace, built 1872, Crocket, Saunders & Co., Wytheville, Wythe co. In blast in 1872.
Reed Island Furnace, Barrett & Forney, Wytheville, Wythe co. Building.
Salisbury Furnace, Salisbury Iron Manufacturing Co., Saltpetre Cave, Botetourt co.
Shenandoah Iron Mining and Manufacturing Co., Shenandoah Iron Works, Page co.
Van Buren Furnace, King, Newmarket, Shenandoah co. Building.
Victoria Furnace, Ira F. Jordan & Co., Tolersville, Louisa co. In blast in 1872.
Walton Furnace, built 1872, Howard & Saunders, Max Meadows, Wythe co. In blast in 1872.
The New Jersey Iron Co. will probably build a furnace during the coming season.

WEST VIRGINIA.

COKE.

Belmont Nail Works Co., Wheeling, Ohio co. Furnace building; to go in blast August, 1873; 14 feet bosh; capacity 40 tons per day.
Martin Furnace, George Hardman, Raccoon, Preston co.
Riverside Furnace, Dewey, Vance & Co., Wheeling. Furnace in Marshall co.
Wheeling Iron and Nail Co., Wheeling, Ohio co. Building an 18 feet bosh furnace.

CHARCOAL.

Clinton Furnace, George Hardman, Clinton, Preston Co. Abandoned.
Gladeville Furnace, George Hardman, Gladeville, Preston co.

PROJECTED.

New York parties contemplate the erection of several blast Furnaces in the Kanawa Valley during the summer of 1873.
M. H. Pike, Putnam co., proposes to build several patent furnaces to make wrought iron from the ore.

KENTUCKY.

HANGING ROCK DISTRICT—BITUMINOUS COAL.

Ashland Iron Works, Lexington and Big Sandy R. R. Co., Ashland, Boyd co. In blast 1872.
Star Furnace, Norton Iron Works, Ashland, Boyd co. Furnace in Carter co.; in blast in 1872, but the works are soon to be removed to Ashland.

PROJECTED.

Norton Iron Works, Ashland, Boyd co.

CHARCOAL.

Bellefonte Furnace, Means, Russell & Co., Ashland, Boyd co. In blast in 1872.
Belmont Furnace, Belmont and Nelson Iron Co., Bullitt co. Not in blast in 1872.
Boone Furnace, Nathaniel Sands & Co., Boone Furnace, Greenup co. Not in blast in 1872.
Buena Vista Furnace, Means & Co., Ashland, Boyd co. In blast in 1872.
Buffalo Furnace, Culbertson, Earhart & Co., Greenupsburg, Greenup co. In blast in 1872.
Clear Creek Furnace, John O. Miller, Supt., Costigan, Bath co. One stack; not in blast in 1872; to be put in blast in June, 1873.
Cottage Furnace, Cottage Furnace Co., Irvine, Estill co. One stack; not in blast in 1872, but will be in 1873.
Estill Furnace, Estill Furnace Co., Irvine, Estill co. One stack; in blast in 1872.
Hunnewell Furnace, Kentucky Improvement Co., Greenupsburg, Greenup co. In blast in 1872.
Kenton Furnace, Kenton Furnace Co., Greenup co., addressed at Portsmouth, Ohio. In blast in 1872.
Laurel Furnace, Robert Scott & Co., Greenupsburg, Greenup co. In blast in 1872.
Mount Savage Furnace, Lexington and Carter Co. Mining Co., Mount Savage Furnace, Carter co. In blast in 1872.
Nelson Furnace, Belmont and Nelson Iron Co., Nelson Furnace, Nelson co. Not in blast in 1872.
Pennsylvania Furnace, Kentucky Improvement Co., Greenupsburg, Greenup co. In blast in 1872.
Raccoon Furnace, Raccoon Mining and Manufacturing Co., Greenupsburg, Greenup co. One stack; built in 1831; in blast in 1872; capacity, 14 tons; cold and hot blast.
Red River Iron Works, Red River Iron Manufacturing Co., Red River Iron Works, Estill co. Three stacks; in blast in 1872.

PROJECTED.

Tygert Furnace, Iron Hills Iron and Mining Co., Greenupsburg, Greenup co. Furnace in Carter co.
There are furnaces at Cumberland Gap, at Fitchburgh, Estill co., and in Crittenden co., about which no information could be obtained.

ABANDONED.

Amanda Furnace, Means, Russell & Means, Ashland, Boyd co.
Clinton Furnace, Means, Russell & Means, Ashland, Boyd co.
Caroline Furnace, Norton Iron Works, Ashland, Boyd co.
New Hampshire Furnace, S. Leaton's estate, Quincy, Greenup co.
Oakland Furnace, Boyd co.
Steam Furnace, Norton Iron Works, Ashland, Boyd co.

WESTERN REGION—CHARCOAL.

Center Furnace, D. Hillman & Sons, Eddyville, Lyon co. Hot blast; capacity, 14½ tons; in blast in 1872.
Laura Furnace, Pringle & Haynes, Laura Furnace, Trigg co. Cold blast; out of blast for several years; started afresh in April, 1873.
Mammoth Furnace, Morris, Machen & Co., Eddyville, Lyon co. Hot blast; capacity, 16 tons; to go in blast in June, 1873.
Trigg Furnace, D. Hillman & Sons, Trigg Furnace, Trigg co. Hot blast; capacity, 18 tons; in blast in 1872.

PROJECTED.

Morris, Machen & Co., Eddyville, Lyon co. Coke. Two stacks; hot blast; capacity, 35 tons.

TENNESSEE.

DYESTONE REGION.

Roane Furnaces, J. T. Wilder, Manager, Rockwood, Roane co. Bituminous coal. Two stacks; one in blast in 1872; one built in 1872.
Cumberland Gap, Claiborne co. Charcoal. Went in blast for the first time in 1873; cold blast; eight tons capacity.

EASTERN OR UNAKA REGION—CHARCOAL.

Bushong's Furnace, Sullivan co. In blast in 1872.
Embreeville Furnace, Bradley & Co., Jonesboro', Washington co. In blast in 1872.
Greene County Iron Works, Greene County Iron Co., Haysville, Greene co. In blast in 1872.
New York and East Tennessee Furnace Co., Haysville, Greene co. In blast in 1872.
Clark, Quaif & Co., lessees, are making daily from 3 to 4 tons cold blast charcoal iron from an old stone stack furnace on Stony Creek, three miles above its entrance into Watauga River, Carter co.

BITUMINOUS COAL.

Knoxville Furnace, Clark, Quaif & Co., Knoxville, Knox co. In blast in 1872.

PROJECTED.

A new furnace is projected at the Lambert Ore Banks, in Carter co., about 55 ft. in hight, with 3 tuyeres, and a bosh of 13 feet., and will make about 10 tons of iron daily.

WESTERN REGION—CHARCOAL.

Bear Spring Furnace, Woods, Yeatman & Co., Stewart co. Rebuilt in 1872; in blast in 1873.
Brownsport Furnace, Walker & Young, Brownsport Furnace, Decatur co. In blast in 1872.
Buffalo Furnace, W. C. Napier, Lawrence co. Repairing.
Clark Furnace, Garret, McDowell & Co., Stewart co. In blast in 1872.
Cumberland Furnace, J. P. Drouillard, Cumberland Furnace, Dickson co. In blast in 1872.
Dover Furnace, Woods, Yeatman & Co., Dover, Stewart co. In blast in 1872.
La Grange Furnace, Garret, McDowell & Co., Stewart co. In blast in 1872.
Lewis Furnace, Thomas & Co., Lewis co. Building.
Mt. Vernon Furnace, Sechlar, McCulloing & Co., Montgomery co. In blast in 1872.
Rough and Ready Furnace, A. Guckenheimer & Bro., Rough and Ready Furnace, Stewart co In blast in 1872.
Wayne Furnace, Gaylord & Co., Wayne Furnace, Wayne co. In blast in 1872.
Worley Furnace, Orr, Newell & Co., Worley Furnace, Dickson co. In blast in 1872.

PROJECTED FURNACES.

Chattanooga, Hamilton co. Two stacks.
The ore generally reduced by all the Furnaces in the Western Region of Tennessee is known as Limonite. In the Dyestone Region the ore used is stratified fossiliferous hematite.

NORTH CAROLINA.

CHARCOAL.

Buckhorn Furnace, Cape Fear Iron and Steel Co., Heckton, Chatham co. Hot blast; water power; two stacks, 10 by 50; in course of erection.
Endor Furnace, Cape Fear Iron and Steel Co., Endor, Chatham co. One stack, 37 by 8; in blast in 1872.
Long Creek Furnace, Admiral Wilkes, Gaston co. Daily capacity, 4 tons.
Madison Furnace, built 1790, Johnson, Higgins & Co., Lincoln co. Daily capacity, 4 tons.
Ore Hill Furnace, Niesbet & Creene, Ore Hill Furnace, Chatham co. Daily capacity, 4 tons; in blast in 1872.
Rehoboth Furnace, built in 1810, Jonas Darr, Lincoln co. Daily capacity, 4 tons; in blast in 1872.
Stonewall Furnace, built 1863, Higgins & Co., Lincoln co. Daily capacity, 4 tons; in blast in 1872.
Vesuvius Furnace, built 1780, Johnson, Higgins & Co., Lincoln co. Daily capacity, 4 tons.
Danbury, Stokes co. Daily capacity, 4 tons; not in blast in 1872.

BITUMINOUS COAL.

Sapona, Furnace, Creene & Co., Chatham co. Daily capacity, 5 tons.
The Gulf Furnace, Chatham co. Daily capacity, 5 tons; not yet in blast.

ALABAMA.

CHARCOAL FURNACES.

Bibb Furnace, Bibb Iron Co., Bibb co. Two stacks; built 1862; one in blast in 1872; one abandoned.
Briarfield Furnace, Shelby co. Not in blast in 1872.
Cornwall Iron Works, Cherokee co. Cold blast; capacity, 8 to 10 tons; will go in blast in June, 1873.
Giles, Edwards & Co., Jefferson co. One stack building.
Irondale Furnace, Jefferson Iron Co., Irondale Furnace, Jefferson co. One stack; in blast in 1872; hot blast; capacity, 15 tons; size, 40 by 10.
Oxford Iron Works, Jackson co. Now building.
Red Mountain Works, Red Mountain Iron Co., Ironton, Jefferson co. Two stacks; hot blast; capacity, 50 tons; one remodeling and nearly completed; one in blast. Each stack is 60 by 12. Use fossiliferous ore.
Roups Valley Furnaces, Thomas & Co., Jefferson co. Three stacks; built from 1861 to 1863; not in blast since 1865.
Salt Creek Iron Works, Horace Ware & Co., Talladega co. Now building.
Shelby Iron Works, Shelby Iron Works, Shelby co. One stack, built 1862, in blast; a second stack building, to be 60 by 14.
Stonewall Iron Works, Stonewall Iron Co., Cherokee co. Hot or cold blast; capacity, 15 tons; just finished.
Woodstock Iron Works, Noble Brothers, Calhoun co. One stack, 43 by 12; hot blast; went into blast in April, 1873; capacity, 25 tons. Use brown hematite ore.
As the coal region of Alabama is fast being developed, the above furnaces will very probably, at no distant period, change to the use of coal for fuel.

PROJECTED.

New furnaces are projected by the Alabama Central Iron Co., at Tanhill, Jefferson co., by the Alabama IronCo., at Turkey Creek, Jefferson co., and by the Tecumseh Iron Co., of Cherokee co. That of the last named is to be a hot-blast furnace, one stack, 60 by 12, charcoal.

GEORGIA.

CHARCOAL FURNACES.

Rogers & Doley, Cartersville, Cass co. One stack; completed in 1873; now in blast, size of stack 30 by 8.
Cherokee Iron Works, Cherokee Iron Co., Cedartown, Polk co. Furnace in course of erection.
Ætna Furnace, Ætna Furnace Co., Prior's station, Polk co. Cold blast; built in 1871; capacity, 10 to 12 tons daily; went in blast in April, 1873.
Stump Creek Furnace, Styles & Co., Cartersville, Cass co. One stack, 34 by 7; in blast in 1872; cold blast.
Tecumseh Furnace, Polk co. In course of erection; to be hot blast; capacity, 15 tons.

PROJECTED.

Rome, Floyd co. Bituminous coal and coke

Trade Report.

Office of The Iron Age,
Wednesday Evening, June 4, 1873.

The past week has been comparatively uneventful in Wall street. Money has been abundant, with no immediate prospect of stringency, and demand loans have been readily obtainable at 5 @ 6, and, in some instances, at 3 per cent. There has been an active demand for commercial paper at 7 @ 8 per cent. The banks are now in a position to accommodate their patrons, but as there is just now no especial demand for an extension of bank credit, the business community are deriving less benefit from the prevailing ease than they will harm from the stringency which, before the end of another season, must inevitably overtake the market. We are glad to discern evidences of a disposition among our business men to encourage the establishment of banks which, limiting their business to the reception of deposits and the discounting of commercial paper, shall be free from all legal restrictions, and independent of the unwise laws with which Congress has tied up the national banks. We shall have more to say about this movement at another time.

The decline in gold is chiefly attributable to the payments made by the Treasury on account of the 5-20 bonds presented for redemption on the call for $50,000,000. About $7,000,000 will be bought, and the remaining $43,000,000 turned in payment for the new 5 per cents. The Treasury has further depressed the market by announcing that it will sell $7,000,000 of gold during June and buy only $1,000,000 of 5-20s; and foreign exchange is weak, ruling ⅛ to ¾ per cent. below the point at which gold can be profitably exported. The following shows the daily range of the premium.

	Highest.	Lowest.
Thursday	118⅛	117⅞
Friday		
Saturday	118⅛	117¾
Monday	117⅞	117⅜
Tuesday	117⅞	117⅞
Wednesday	118⅞	118⅞

The stock market has been dull. Pacific Mail and Union Pacific have been weak, but in other stocks a slight improvement is reported. The principal dealings have been in New York Central, Rock Island, Lake Shore and Western Union. The highest and lowest of to-day's quotations on 'change are given below.

Notwithstanding the decline in gold, government bonds have remained strong, but the market is without noteworthy features. We give below the closing quotations of governments:

The following will show the foreign trade movements for the week:

IMPORTS.

	1871.	1872.	1873.
Tot. for week	$7,671,435	$12,235,782	$6,515,921
Prev. reported	155,344,208	183,971,670	179,748,658
Since Jan 1	$163,015,643	$196,207,452	$186,264,579

Included in the imports of general merchandise for the week are:

	Quant.	Value.
Anvils	70	$1,195
Brass goods	7	964
Bronzes	7	771
Chains and anchors	85	4,629
Copper		642
Cutlery	77	18,854
Guns	11	1,092
Hardware	41	4,315
Iron, hoop, tons	35	2,992
Iron, pigs, tons	2,859	96,278
Iron, sheet, tons	132	11,575
R. R. bars	3,258	209,888
Iron cotton ties	644	2,728
Iron, other, tons	728	39,590
Lead, pigs	3,677	23,135
Metal goods	181	25,151
Needles	18	8,417
Old metal		167
Saddlery	10	1,577
Steel	3,111	45,410
Silverware	1	139
Tin, boxes	9,747	96,276
Tin, 800 slabs	56,794	16,373
Wire	494	7,433
Zinc	57,714	4,400

EXPORTS, EXCLUSIVE OF SPECIE

	1871.	1872.	1873.
For the week	$4,162,110	$3,782,647	$5,396,442
Prev. reported	92,866,539	84,837,538	111,328,636
Since Jan. 1	$97,028,079	$88,540,185	$116,725,078

EXPORTS OF SPECIE.

Total for the week	$526,922
Previously reported	19,787,825
Total since January 1, 1873	$20,314,747

The last bank statement was favorable, the banks now holding $4,918,400 lawful money above a 25 per cent. reserve, against $4,071,475 last week. The national banks have, according to the statement, a percentage of 27·01 reserve and the state banks of 23·25, making the percentage of both classes taken together 27·09. The following is a comparison covering the past two weeks:

	May 24.	May 31.	Differences.
Loans	$279,846,300	$277,958,800	Dec. $1,887,500
Specie	20,632,600	19,482,000	Dec. 1,150,600
Circulation	27,493,800	27,447,100	Dec. 46,700
Deposits	209,762,300	208,136,500	Dec. 1,625,800
Leg. Ten.	42,752,900	44,332,300	Inc. 1,579,400

Government bonds closed at the following quotations:

	Bid.	Asked.
U. S. Currency 6s	113⅛	113½
U. S. 6s, 1881, reg	115½	116
U. S. 6s, 1881, c	117⅞	118
U. S. 6s, 5-20 reg, May and Nov	116⅜	116⅝
U. S. 5-20, 1862, c	116⅜	116⅞
U. S. 5-20 1864, c	116⅜	116⅞
U. S. 5-20 1865, c	117⅞	118⅜
U. S. 5-20 1867, r. Jan. and July	115⅛	115⅜
U. S. 5-20 1865, c. Jan. and July	119⅛	119⅜
U. S. 5-20 c 1867	121⅛	....
U. S. 5-20 c 1868	....	120¾
U. S. 10-40 reg	112½	113⅛
U. S. 10-40 c	114⅜	114⅝
U. S. 5s 1881	115⅝	....
U. S. 5s 1881 cou	....	115⅝

The following were the highest and lowest prices of stocks to-day:

	Highest.	Lowest.
N. Y. Cen. & Hudson Consolidated	101⅝	101⅛
Lake Shore	91⅞	91⅛
Rock Island	109⅝	109⅛
Del., Lack and Western	105	104⅞
Wabash	69	68⅝
Harlem	133⅛	132
Western Union Telegraph	85⅝	84⅞
Milwaukee & St. Paul	55	54⅝
Milwaukee and St. Paul Preferred	73⅞	73
Panama	113	111⅝
Pacific Mail	41⅞	40⅝
Erie	62⅛	61
Ohio & Mississippi	42⅞	41
Boston, Hartford and Erie	2⅞	2¾
Union Pacific	28⅝	28⅛
C. C. & I. C.	31⅞	31
Quicksilver	41	40

GENERAL HARDWARE.

The condition of the market is one of decided dullness, and there is very little to report in the way of changes. It is not probable that many will occur before the first of July, and we see no particular reason to look for many then. The business this spring has been, on the whole, up to the expectations of most manufacturers, but the jobbers are complaining. A good many goods were carried over from last year, and buyers of all kinds have been making their purchases as light as possible. This prevented bills from being very heavy, but it leaves the market in a healthy position, and one which promises well for the future.

There has been a great deal of irregularity in the prices of Wrought Iron Hinges and Butts, and in the present absence of business we are unable to make quotations, as manufacturers are unwilling to name prices unless to parties who desire to buy. The break in prices began at the West, and had its origin in the desire of jobbers to sell goods bought at low prices, as well as the unwillingness of Western makers to accumulate stocks. Strap and T Hinges are weaker than Butts, as they are made by a considerable number of concerns, while the manufacture of Butts is confined to a few.

Our readers cannot fail to notice the advertisement of A. Field & Sons, the well-known manufacturers of Tacks, etc., on the fifteenth page. They have established a New York warehouse at 35 Chambers street, in the store of the Ausable Horse Nail Company, where they keep a full stock of the various articles made by them.

Graham & Haines are now the sole agents of the American Butt Company, and carry a full line of their goods, which they will sell at factory rates. Graham & Haines are printing, and will issue about July 1st, a new catalogue and price list of the manufacturers they represent and the goods they sell.

Trade in foreign Hardware, both English and German, is without special feature. The demand continues light, but prices remain firm and unchanged. The English File manufacturers are again suffering from the discontent of their workmen, and strikes are at present the order in this branch of industry. What the effect will be on prices the future alone can determine. Prices here are without change.

There is a fair demand for Nails, considering the season, and no change to report in the situation as regards prices. The general tone of the market is decidedly weak, but we have not heard of any transactions at better figures than $4·75 for 10d. For small lots the price is irregular, but a bona fide purchaser would experience little difficulty in placing an order of from 50 to 100 kegs at the lowest named rate, viz., $4·75, net, for 10d to 60d. We quote Nails at $4·75 @ $5, net, for 10d. The card rate, which is only nominal, is unchanged. There is no change to note in the price of Horse Shoes for the month of June.

J. K. Moorhead & Co., of Pittsburgh, Pa., have sold the machinery, tools, patents and good will of the Novelty Works to the Jones & Nimick Mfg. Co., whose style has been changed to the Jacobus & Nimick Manufacturing Company. Samuel H. Jacobus is general manager. In a circular published by the Jacobus & Nimick Mfg. Co. they say, "We shall add to our former well-known line of Builders' Hardware the celebrated Janus Faced Locks and Latches, Scales, Coffee Mills, &c., heretofore manufactured by J. K. Moorhead & Co."

IRON.

American Pig.—The companies continue firm in their views at $50 for No. 1, and it is only outside lots that are obtainable below that figure. These are lots that have been and are now being delivered by the companies on contracts made early in the season, which being pressed on a generally dull market, will not bring the companies' asking prices. The general consuming demand has been light for some time past, though of late a certain class of consumers have been operating quite freely, and we understand the furnaces have sold a very large quantity of Iron for future delivery, part running into next year, chiefly of No. 2 extra and Gray Forge brands, but the particulars are withheld from the public. We have only sales to notice of 100 tons No. 1 Allentown at $48; 50 tons No. 1 Carbon at $50, and 200 tons Gray Forge at a private price. We quote No. 1, $48 @ $50; No. 2 extra, $46, and Gray Forge, $39 @ $41.

Scotch Pig.—The market for Scotch Iron has become very quiet. Importers show less disposition to realize than for a few weeks past, and the late sales having been at a serious loss. Iron cannot be sold here to-day any higher than it will bring in Glasgow with the duty added, so that to sell would entail on the owner the entire cost of freight, insurance, brokerage, and all incidental charges. Most of the stock is now in yard, though a few lots are still on the dock, but even these are not pressed for sale. The late arrivals have been mostly of lots contracted for earlier in the season by the steamship companies, and they are therefore the principal losers. Sales since our last include 100 tons Glengarnock at $48, 275 tons do. and 100 tons Monkland on private terms. We quote: Coltness, $58; Gartsherrie, $56 @ $57; Glengarnock, $48 @ $50; and Eglinton, $46 @ $48.

Following are the prices of Scotch Pig Iron in Glasgow, as reported by Messrs. J. E. Swan & Bros., under date of May 16, 1873:

GLASGOW BRANDS.

	No. 1	No. 3	No. 4
Gartsherrie	135/	118/	....
Coltness	137/6	118/	....
Summerlee	135/	118/	120/
Langloan	135/	116/	....
Govan	117/6	116/6	120/
Calder	*135/	118/	....
Shotts, Bessemer	175/	170/	....
do. Ordinary	135/	117/6	....
Carnbroe	134/	118/	118/
Wishaw	130/	117/6	120/
Monkland	125/	117/6	....
Chapelhall	135/	117/6	....
Clyde	120/	117/6	115/
Quarter—Clyde	120/	117/6	115/

Glasgow Warrants 3-5, No. 1; 2-5, No. 3, g. m. b. 116/4½.

*f. o. b. Glasgow, 1/ per ton, extra.

WEST COAST BRANDS—*f. o. b. Ardrossan.*

Glengarnock, Ardeer	125/	118 6	....
Eglinton, Lugar, Muirkirk, Portland (Branded Eglinton)	118/	116/	117/
Dalmellington	118/	117/	114/

CURRENT RATES OF FREIGHT ON PIG IRON.

To	From Glasgow.	From Ardrossan.
New York	15/	15/
Boston	17/	17/
New Orleans	20/	20/
Baltimore	17/	17 6
Philadelphia	16/	16/
Providence	20	15/

Bar.—Refined Bar from store continues dull and depressed. Prices are still too high to admit of importation, and must be considered wholly nominal. From mill the rate is 3·9 @ 4 cents per pound.

Old Rails.—Since the late free transactions in Old Rails, the market has become extremely quiet. Most of the stock is under control of one house, who are holding for an advance, and quotations are nominal and altogether useless in absence of business.

Rails.—There has been nothing done in new Rails, and the market is without new features of importance. We quote English at $70, gold, and American at $80, currency, from the mills.

Scrap.—The demand for No. 1 Wrought Scrap from yard is only moderate and prices without much apparent strength. Sales could not be forced at over $45, while a buyer would probably have to pay fully $48. We note sales of 250 tons at Providence, forced out at $45, and 200 tons here at $48.

METALS.

Copper.—There is scarcely any inquiry for domestic Ingot, and the market presents an uninteresting appearance. Early in the week 100,000 lbs. Lake sold at a private price, but otherwise there has not been a single transaction of importance reported. In the absence of demand, prices are depressed and lower, though they must be considered wholly nominal. The new production is beginning to arrive, some 800,000 lbs. having thus far come forward, but all the receipts so far had been contracted for previously, so that none has been offered on the market for sale. We quote spot lots Lake nominally at 30c.. English Copper is also very quiet and transactions limited to one or two small parcels at about 29½c. We quote at 29¼c. @ 29½c. for Best Selected, 30 days. Manufactured Copper and Yellow Metal Sheathing continue steady at former prices. We quote New Sheathing at 43c., Bolts and Braziers' at 45c., Bronze and Yellow Metal Sheathing at 72c , and Yellow Metal Bolts, 32c. net cash.

Tin.—The market for Pig continues exceedingly dull and depressed. Prices have been further reduced, but remain entirely nominal in the absence of actual demand. We notice the sale of 100 slabs Straits at 31c., gold. We quote the market at 31c. for Straits, 30c. for English, and 36c. for Banca, all gold. There is only a small trade doing in Tin Plates, and prices are weak and unsettled. Advices by cable report a decline abroad, which adds to the depression here. We quote I. C. Charcoal at $11 @ $11·37½, I. C. Coke at $8·62½ @ $9·25, Charcoal Terne at $9·50 @ $10, and Coke Terne at $7·75 @ $8·75, all gold, for fair to good brands.

Lead.—The demand for foreign Pig is only moderate, but prices continue fully as firm as heretofore. We note sales of some 90 tons Spanish, in lots, at 6⅝c., gold. Domestic is also quiet, but firm. We quote: Spanish and German, ordinary brands, at 6¾c. @ 6⅞c., gold; English, 6⅞c. @ 7c., gold; foreign refined, 7⅛c. @ 7¼c., gold, and domestic, 6⅛c. @ 6⅝c., gold. Manufactured remains steady at 9¼c. for Bar, 10½c. for Sheet and Pipe, and 16½c. for Tin-lined Pipe, less the usual discount to the trade.

Spelter and Zinc.—The business in foreign brands of Spelter is limited to a few unimportant lots, on a basis of 7⅝c. @ 7⅞c., gold, for Silesian. Large parcels may be quoted at 7½c. @ 7⅝c., gold. Sheet Zinc continues dull, but about steady, at 10c., less 4 per cent., gold, from agents' hands.

Antimony.—We note sales of 5 casks Regulus at 14c. @ 14¼c., gold, but these prices would probably be shaded for round lots.

The following is the review of the metal market specially prepared for *The Iron Age* by Messrs. Thos. J. Pope & Bro.:

Money continues easy and trade very quiet. Prices are not materially changed. A rumor that the Bank of England advanced its interest to-day to 7 per cent. has again strengthened the gold market, and we look for higher prices in gold as a consequence.

Ingot Copper.—Quiet and drooping, and is nominally unchanged.

Pig Iron.—Market unchanged. A few forced sales of a new and unknown brand have been made. Demand light, and stocks about the same.

Old Rails.—Quiet at $50, currency.

Scrap Iron.—$45 to $48, currency.

Lead.—Nominal. Spanish, 6⅝c. to 7⅛c.

Tin.—Dull. Market without sales of importance.

Antimony.—Quiet and nominal.

Spelter.—7⅝c. to 7⅞c., gold, for Silesian.

PHILADELPHIA.

Messrs. Blakiston & Cox, 333 Walnut street, under date of June 3, report as follows: *American Pig.*—Manufacturers are sold well up to their make, are making their deliveries promptly, and are selling little ahead of their production. The prices claimed for the different brands are varied, the Lehigh companies, as a rule, being still firm at quoted prices. Other producers are, in consequence of the unsettled condition of the market, disposed to accept lower figures, and we know of prime Irons offered at prices much below their present value. Consumers are doing an active business, and are getting full prices for their work. The volume of trade for the past few months has not been heavy, but has been free from loss, and the credit of those engaged has been safer than otherwise. Prices are quoted at about $49 for No. 1 Foundry, $47 No. 2 Foundry, on the wharf here, Gray Forge at $38, and White and Mottled at $34, at furnace. In Scotch Pigs and Scrap we hear of no recent transactions.

PITTSBURGH.

May 31.—The Pig Iron trade continues as dull as ever, and the market is weak, and notwithstanding present prices barely cover the actual cost of making it, the tendency is still downward. The furnaces have commenced to receive their high priced ore, that from the Iron Mountain mines costing $10 per ton instead of $5 to $5·50, which was the price last year, and that from Lake Erie $13 to $14, against $9 to $10 last year. Thus it will be seen, with the cost of ore nearly doubled, no reduction in fuel or labor, and the price of the product down from $10 to $12, as compared with the highest point, that producers are in a very ugly position, one from which they will be unable to extricate themselves for some time to come. The outlook is certainly very discouraging. The very best Mill Irons are quotable at $38 to $40, 4 mos., and there is very little inquiry for it at any price. Commission men generally are still holding choice brands at $40, but there was nothing sold this week above $38, and no considerable amount could be sold at this figure. Common Irons, to use a common phrase, can scarcely be given away. It is not wanted at any price, as consumers generally are well stocked, and the little inquiry there is is for the best grades, of which small lots are being taken to keep up mixtures. White and Mottled may be quoted nominally at $34 to $36. It is impossible to quote Foundry Irons, as there are so many different kinds passing in the same classification. There is a range of from $3 to $6 per ton in No. 1, sales being reported at from $42 to $48. Charcoal Irons very dull, but prices are nominally unchanged; sales of small lots of Cold Blast at $55 to $58. Blooms dull and nominal at $100 to $120, according to quality; the sales reported have not averaged much, if any, over one car per week. There is no improvement to note in finished Irons. The market is as dull and unsatisfactory as ever, and prices continue to shrink; it is fairly quotable at 3·65, cash, and 3·75, time, and large buyers are holding back in expectation of being able to buy at 3½, but as yet there have been no orders booked that your correspondent can hear of under quotations. The Nail trade is also dull and unsatisfactory, and, as prices are lower, may be quoted at $4·65 to $4·75, cash and time. The Steel trade is also dull, but it has until recently been very good, American being so much cheaper than English having caused a largely increased demand. Copper manufacturers still complain of dull times, and there is no hope for an improvement until prices are reduced considerably, and this cannot be done until the cost of the raw material has been lessened very materially. There will be a meeting of the Copper manufacturers in your city on the 6th of June, to discuss the condition of the trade, present and prospective, and to take such action as may be deemed prudent for the best interests of the business. The Window Glass trade continues very dull and unsatisfactory, with but little prospect at present of an early change for the better. It is generally conceded that there is no margin at present, but there is a strong disposition to sell, particularly on the part of those who need money, as they would rather have their glass shaded than their paper. Discounts are still quotable at 60 and 5 and 60 and 10 for round lots, and a heavy cash buyer might possibly do better than quotations. The corporate name of the Jones & Nimick Manufacturing Co. has been changed to that of the Jacobus & Nimick Manufacturing Co., and they have added the extensive establishment of the Pittsburgh Novelty Works, recently owned and managed by Gen. J. K. Moorhead & Co. Alexander Nimick, Esq., is president of the company, and Samuel H. Jacobus, general manager. The specialties of this corporation are Locks, Latches, Knobs, Scales, Coffee Mills, and Builders' Hardware generally. The Petroleum trade has been in an unsettled condition during the past week, and trade has been restricted thereby. Producers are making a vigorous effort to swell the value of crude, but refiners claim they cannot advance the price of the product, and that, consequently, they are unable to pay any advance for the raw material. The refiners, not only of Pittsburgh, but at other points, have been doing very well since the formation of the refiners' combination, by the workings of which they are enabled to have a margin all the time.

The Pittsburgh *Commercial*, May 31, says: We can report no material change in the market for raw Iron since last week, the manufacturers being unwilling to buy metal at any price while the demand for manufactured goods is so unsatisfactory, and therefore the only sales made are Irons wanted for special purposes and immediate use. We are reported the following sales:

BITUMINOUS COAL SMELTED FROM L. S. ORE.

500 tons gray forge	$38 00—6 mos.
300 tons gray forge	38 00—4 mos.
100 tons gray forge	38 00—4 mos.

ANTHRACITE.

140 tons No. 1 foundry	$42 00—5 mos.
50 tons No. 1 foundry	44 00—4 mos.
40 tons No. 2 foundry	40 00—5 mos.
30 tons No. 1 foundry	42 00—4 mos.
20 tons No. 2 foundry	42 00—4 mos.
20 tons No. 3 foundry	38 00—4 mos.

CHARCOAL.

10 tons No. 1 foundry, Hanging Rock	$55 00—4 mos.
5 tons No. 1 foundry, Hanging Rock	58 00—4 mos.

BOSTON.

May 31.—The Boston Iron market is quiet, with no large sales, though there is a steady retail demand. Prices of Refined Bar are without change, and steady at our quotations. In Pig Iron there is very little doing. American is fully as low as last week, and Eglinton, of which there has been an arrival of an invoice of about 1000 tons, is a little lower. We quote yard lots of American Pig Iron at $52 to $56 per ton, including No. 2 extra at $50 to $52, and No. 1 at $55 to $56. We quote Eglinton at $52 to $53, Coltness at $62 to $63, Gartsherrie $62, Charcoal at $58 @ $62.—*Com. Bulletin.*

SAN FRANCISCO.

May 28.—*Hardware*—Business revives a little. We quote Amoskeag Axes, unhandled, $14 to $15; do. handled, $18·50 to $19·50; do. Puget Sound Axes, unhandled, $14·50. Hatchets—Amoskeag, Shingling No. 1, $7·25; No. 2, $8; No. 3, $8·75; do. Claw, No. 1, $7·75; No. 2, $8·50; No. 3, $9·25; Collins' Handled Axes at $17·50 to $20, according to weight. *Metals*—The demand for Pig Iron is very light. Small sales continue to be made in lots at $52·50 for Scotch—best brands held higher. Foundrymen are carrying heavy stocks bought a year ago to arrive. We note the sale of 45 pigs Block Tin, ex. Japan, private, quotable at 36c. *Nails.*—Imports from January 1st to May 16th: kegs, 41,229. There is but little inquiry at the very low rates ruling; no sales of moment consummated. The last sales, ex ship, of invoice parcels, were at $5·37½. The trade prices remain as heretofore: $5·75 for 10d. to 60d.; 8d. and 9d., 25c. per keg above 10d.; 6d. and 7d., 50c. do. do. 10d.; 4d. and 5d., 75c. do do 10d.; 3d., $1·50 do. do. 10d.; 2d. and 3d., fine, $2·25 do. do. 10d.; Cut Spikes, all sizes, 25c. above 10d. Thus the jobbers' range is $5·75 to $8·75.—*Com. Herald.*

ST. LOUIS.

Messrs. Semple, Birge & Co., under date of 31st ultimo, write us: Trade in Hardware and kindred lines continues steady and ordinarily good for the season. Job orders from the larger Southwestern markets are running light. The universal stringency of the money market retards all business operations to a large extent. Hardware staples consumed in such public works as railroad building, engine and bridge construction, are having ordinarily active demand, but items in general for private use are sparingly taken. While there are manifest grounds for serious apprehension of trouble ahead in financial matters, still nothing is more clear than that these severe times are weeding out of the ranks of business a flimsy element that has been but an annoyance and a hindrance in the way of the class of legitimate and substantial dealers. It is, indeed, a severe course of treatment, but one from which the patient will emerge in healthy condition, and with good fighting weight.

CINCINNATI.

Messrs. Addy, Hull & Co., under date of June 2, write us as follows: The market has ruled steady, with a moderate demand. Consumers buy cautiously, and, as a rule, only to supply present wants. Forge Irons offered at the current low prices are taken up more freely, the impression prevailing that bottom figures have been reached. Car Wheel grades are in fair demand:

HOT BLAST CHARCOAL.

Hanging Rock No. 1..℔ ton..	$54·00 —4 mos.
" " No. 2	50·00 @ 51·00—4 mos.
" " Forge	41·00 @ 43·00—4 mos.
Tennessee No. 1	51·00 @ 53·00—4 mos.
" Forge	41·00 @ 43·00—4 mos.
Alabama No. 1	54·00 —4 mos.
Missouri No. 1	54·00 @ 59 00—4 mos.
" No. 2	51·00 @ 58·00—4 mos.

HOT BLAST STONE COAL.

Missouri No. 1.... ℔ ton..	$52·00 @ 53·00—4 mos.
" Forge	42·00 @ 43·00—4 mos.
Ohio No. 1	50·00 @ 52·00—4 mos.
" Forge	39·00 @ 40·00—4 mos.
Scotch Pig, No. 1	

COLD BLAST CHARCOAL.

Hanging Rock Car Wheel ℔ tn.	$60·00 @ 65·00—4 mos.
Missouri " "	60·00 @ 62·00—4 mos.
Kentucky " "	58·00 @ 60·00—4 mos.
Tennessee " "	58·00 @ 60·00—4 mos.
Georgia " "	60·00 @ 63·00—4 mos.
Alabama " "	60·00 @ 63·00—4 mos.
Machinery and Forge	58·00 @ 60·00—4 mos.
Blooms	112·00 @ 115·00—4 mos.

CHICAGO.

May 29.—*Hardware.*—Our local market is quiet. Prices are steady. *Iron.*—Merchant Bar Iron is lower at the recent decline, and prices are rather weak, but without quotable change. *Pig Iron.*—Quotations are somewhat weak for American and Foreign, and after the 1st prox. there will be a new schedule of rates then established. *Tinners' Stock.*—The export market is firm, and prices of Tin Plate are without a decline, but our local market is dull, owing to the dullness of the trade, and prices are 50c. lower per case for all qualities. Other quotations are without change.—*Jour. of Com.*

BALTIMORE.

Messrs. Wyeth & Brother, Iron and Steel merchants, corner of South Charles and Lombard streets, report us the following prices, under date of June 3, 1873: The market here is in a very unsettled condition, and Best Bars being handled at about cost. Trade rules quiet, with but a limited inquiry for immediate wants. Quotations are nominal and shaded to desirable customers.

AMERICAN REFINED BAR IRON.

1 to 6 wide by ⅜ to 1 thick.... / 1 to 4½ wide by 1⅛ to 2 thick..	4·1c. to 4·3c. per ℔.
Round and square, ordinary sizes, from ⅜ to 2 inclusive	4·1c. to 4·3c. "
Hoop Iron, 1⅛ wide and upward	5⅜ to 6 c. per ℔.
Band Iron, from 1⅛ to 4 in. wide	5 to 5⅛c. "
Horse Shoe Iron ⅜ to 1 wide by ⅜ to ⅝ thick	5⅛ to 5⅜c. "
Norway Nail Rods	8c. to 8⅛c. "
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes	17c. "
Machinery Steel	12c. "
Cast Spring Steel	11c. "
Homogeneous Steel Plate	13c. "
Perkins' Horse Shoes, per keg of 100 lbs.	$6·37½
" Mule Shoes " "	7·37½
Common Horse Nails, from 14c. to 18c per pound.	

	10	9	8	7	6
Putnam Horse Nails	23	24	25	26	28c. per ℔.

R. R. Spikes..............5⅛ by 9-16 at 5⅛c. per lb.

LOUISVILLE.

Mr. Geo. H. Hull, under date of June 2, writes us as follows: The demand for Iron is limited, and sales are confined to small lots for immediate use. The market is without quotable change. The usual time, four months, is allowed on quotations below:

HOT BLAST CHARCOAL.

No. 1 F'dry, from Hanging Rock Ores	$54·00 @ 55·00
" 2 " " " "	51·00 @ 52·00
" 1 Forge, " " "	43·00 @ 44·00
" 1 F'dry, from Tennessee Ores	52·00 @ 54·00
" 2 " " "	50·00 @ 51·00
" 1 Forge, " "	43·00 @ 44·00
" 1 F'dry, from Alabama Ores	54·00 @ 55·00
" 1 " " Iron Mountain Ores	54·00 @ 55·00

HOT BLAST STONE COAL.

No. 1 F'dry, from Missouri Ores	52·00 @ 53·00
" 2 " " "	45·00 @ 48·00
" 1 Forge, " " "	40·00 @ 43·00

COLD BLAST CHARCOAL.

Car Wheel from Hanging Rock Ores	60·00 @ 65·00
" " Tennessee Ores	56·00 @ 58·00
" " Alabama Ores	60·00 @ 62·00
" " Georgia Ores	60·00 @ 62·00
" " Missouri Ores	58·00 @ 60·00
" " Kentucky	60·00 @ 62·00

FOREIGN.

GREAT BRITAIN.

Messrs. J. Berger Spence & Co., London, Glasgow and Manchester, under date of May 17, 1873, report:

Metals.—The apparent determination of consumers to limit their orders to actual requirements has had a natural collateral effect on the trade, and the tone generally has been languid, and the transactions limited in extent, have been done at lower quotations. The market for Scotch Pig Iron Warrants has not varied much, but closes firmer. The shipments for the past week again show a decrease as compared with the corresponding period of last year—the exports being for this year 14,090 tons, against 25,378 tons in 1872. The smelters in the Middlesborough district have made no change in their quotations, and with a production which last month amounted to 165,007 tons, find themselves still unable to keep pace with the demand for this description of Pig Iron. For manufactured Iron there is not much inquiry, the high rates required for first-class brands preventing business, whilst for ordinary specifications there is a keen competition amongst the smaller makers. Copper has been sold at cheaper rates, and the advice of a quantity equal to 2550 tons fine Copper, being the amount chartered from the West Coast during the first half of April, has not tended to inprove business either in Chili Bars or English Ingot. A further decline has been made in the value of Straits and English Tin, the demand continuing dull. There has been no alteration in the price of Lead, but quotations are if anything a shade firmer. Spelter is without change.

Iron.—"Ayresome" Yorkshire Pig Iron, No. 1, 129/6; No. 2, 124/6; No. 3, 122/; No. 4 (Foundry), 121/; No. 4 (Forge), 121/ net cash, or 2/ extra 4 months' bills. Scotch Pig Warrants, 116/ to 118/. Staffordshire Bars, £14. 10/ to £16. Hoop Iron, £15. 10/ to £16. Gas Tubes, 30 per cent. off new list. Boiler Tubes, 10 per cent. premium.

Copper.—English Tough Ingot, £96 to £98. Chili Bars, £85 to £86.

Tin.—English Ingot, £140. Straits, £135 to £136.

Tin Plates.—Best Coke, I. C., 34/ to 39/; Charcoal, I. C., 42/ to 44/ per box.

Lead.—Best English Soft Pig, £23. 15/ to £24. Refined Red Lead, £25 to £27.

Antimony.—French Star, £62.

Spelter.—Silesian, special brands, £27. 10/ to £28. English, best brands, £27. 10/ to £28.

BELGIUM.

(Cote Libre.)

Liege, May 10, 1873.—The downward movement in *Iron* begins to be followed by a similar tendency in *Coal.* The reasons assigned for the decline, are on the one hand, the diminishing consumption of some branches of industry, and, on the other, the large quantities of coal imported from the Ruhr country. Pig and Wrought Iron are now offered at reduced prices, and the demand for the latter has virtually ceased for the present. It is extremely difficult to form a correct appreciation as to the immediate future of Iron. There are a great many contingencies constantly arising, prominent among which is the question of wages at the mines and workshops of Great Britain. This question may be creative of a new phase at any given moment, but in the meantime we are remarkably quiet here.

Brussels, May 21, 1873.—*Iron*—In Belgium the general tendency is still toward lower prices, but in spite of the abatement on price lists no orders are received, and a great many establishments have made no change since, despairing of attracting any orders by the further lowering of prices It has now become a struggle of patience, but we fear much that manufacturers will carry the day against producers, notwithstanding the high price of coal, still kept at a figure remunerative to the producer. The owners of iron mines find it a difficult matter to forego profit on what they produce at present, after they have had it all their own way during a lengthened period. Belgian manufacturers complain a good deal of having been left in the lurch by their German customers, to whom they had contracted to deliver 9000 tons early in the campaign. These German firms, when prices broke down in their country, made a wholesale attempt to throw up bargains, but on being sued, have sent their representatives to Belgium, and now endeavor to get out of the scrape on special pleas.

GERMANY.

(Leipziger Tageblatt.)

Leipsic, May 16, 1873.—According to views expressed by a great many manufacturers in the Metal and other branches in Prussia and Saxony during the late fair here, we are on the eve of an industrial

crisis in Germany. The demand for manufactured goods of all kinds has considerably abated of late, and there are unmistakeable signs of the approaching storm. The main cause has to be searched for in over production, and in the impossibility of continuing to flood the United States with German tools and manufactures of all kinds, the less so as France, in its industrial regeneration, has become a most active competitor of ours in America and elsewhere. The immediate effect of the dreaded crisis will, as is usually the case, be felt by the working classes, for a great many shops in Central Europe will be shut and wages will decline. Agriculture will be, to a certain degree, benefited by a partial suspension of manufacturing industry, for the unemployed hands will be diverted, temporarily at least, to field labor, which greatly stands in need of such accession of active forces. The Frankfort *Zeitung* adds the following remarks: "If an industrial crisis is inevitable, we expect the same to arise in Austria first, and thence spread to Germany and the surrounding countries. The crisis at Vienna, which we are now witnessing in financial matters, will of course sap the foundation of many overstrained and overdone manufacturing concerns. Whenever the evils of an industrial convulsion are to reach Germany, they are likely to be preceded by a similar financial crash at Berlin, and of this we perceive no alarming symptoms as yet. It would seem premature, consequently, to indulge in pessimism and reflections at this early stage, although in this instance, like in all other cases of anticipated troubles to come, we are as well forewarned to be fore-armed in due time."

(Borsenhalle.)

HAMBURG, May 16, 1873.—*Metals*—*Lead* is firmly sustained—German at 24½ to 25½ marks; English at 25 to 26; Spanish, 26½. *Copper* is quiet; Northern sorts at 97 to 104. *Tin* unaltered; Banca, 1·65; English, 1·60; rod 1·62½; *Spelter* is firm without dealings.

(Frankfort Zeitung.)

FROM THE RUHR COUNTRY, MAY 19, 1873. The advance in *Coal* anticipated in my last review has occurred; the mines are now loaded down with orders from consumers, who have been delaying their commands from month to month. The lately quite considerable stock at Ruhrort is being rapidly exhausted. The Coal contractors decline to make sales on future delivery, and coal for immediate delivery now already brings 18 guilders per car to the Dutch frontier, 38 to 40 Kreutzers per cwt to Mayence and Manheim, and Forge Coal is quotable at 42.

EAST INDIES.

(Ernsthausen & Oesterley.)

CALCUTTA, May 20, 1873.—*Metal Telegram.*—English Tile *Copper*, 35·8; real Silesian *Spelter*, 10·12; good hard quality, 7·8; *Yellow Metal*, 32·4.

(Aitken, Spence & Co.)

COLOMBO (Ceylon), April 23, 1873.—*Plumbago*—The demand for the United States continues steady, and prices remain firm. Shipments are going on actively, and, judging from the long time that the Thornton and Empress have been loading, it strengthens what we have said in former circulars: that the supply of Plumbago of the quality suitable to the American market is barely equal to the demand, if not rather below it, and this under the stimulus given to production by the high rates which have been ruling for some time past. Should the foreign demand abate, production would be at once curtailed here, rather than bring down prices. We expect a great falling off in exports to the United States, as compared with the three months ending 30th instant, for beyond the Chanticleer and Loch Awe we hear of no further freight engagements, and the rise in Galle, now about to set in, will hinder production for three months to come, nor will there be, from this very cause, any vessels to lay on the berth for the United States. Best quality Plumbago we expect to be sustained in the meantime; it may even go higher still. The Empress is getting on slowly, with 260 tons Plumbago on board, and will shortly proceed to Point de Galle to fill up. The Chanticleer will commence loading in five days from now, and is likely to take 350 tons Plumbago. She has 35 running days to load in. We quote Lump 540/ to 577/6 per ton, free on board, with commission. Exchange, par. Freight to New York, 75/ per ton; Chip, 250/ to 273/; Dust, 140/ to 157/6 per ton. Total Ceylon Plumbago shipments to the United States from here and Galle: Oct. 1, 1872, to April 22, 1873, 23,690 cwts.; against Oct. 1, 1871, to April 23, 1872, 26,342 cwts. Shipments to other countries: Oct. 1, 1872, to April 22, 1873, 27,775 cwts., of which, 269 to Australia, the balance to England.

(Schmidt, Kustermann & Co.)

PENANG, April 12, 1873.—*Tin*—Prices at first were firm at $36·30 per picul; gradually, however, rates began to give way, and some business was transacted at $35·75, and even $35·10. Soon after the last mail had been dispatched quite a demand from Europe arose, and prices reached to $36·30 and $36·50. We have since telegraphic news of the Dutch sale, causing a withdrawal in a body of purchasers, and sellers are compelled to accept lower figures if they wish to effect sales. Last sales at $35·70, and down to $35·50. Stock in Bazar, 5000 piculs.

(Rautenberg, Schmidt & Co.)

SINGAPORE, April 10, 1873.—*Tin* at first declined, and sales of lots on the dock were made at $36·80 to $37 per picul, equal to £150. 7/3 to £151. 7/4 per ton, cost and freight. Prices were subsequently screwed up to $37·25, offers of $37 being declined. Holders would, at this writing, be quite willing to take $37·12½, equal to £151. 17/3, but buyers are not to be met with at this figure at present. Nothing doing in Coal; the market is weaker and altogether nominal. Imported Iron is unaltered. A lot of common Belgian brought $3·50 per picul.

CHINA.

(Siemssen & Co.)

SHANGHAE, March 27, 1873.—*Metals* are rather more quiet, but remain firm. We quote Dawes' Nail Rods, 3·95 taels; Best Staffordshire, 3·70; Rods, 3·50 to 3·60. L. B. Lead may be had at 5·25; German Steel, 5 taels per picul; Swedish, 4·70. *Coal*—A further improvement can be advised. The market is swept of supplies, and nearly all cargoes afloat have already been sold. We quote: Cardiff, 12½ taels per ton; English, 11½; American, 10½; Sydney, 11 to 11½; Newcastle, 11½; Japanese, 6¾; and Formosa, 6½ taels per ton.

AUSTRALIA.

(B. Amsberg & Co.)

PORT ADELAIDE, March 28, 1873.—*Copper*—The market here has during the current month been in a satisfactory condition, and a good business has been done at improving rates. The general aspect of affairs in the colony is of a more cheerful character. We quote Burra-Burra Copper £88 per ton, and Wallaroo £88. *Exchange*—The banks sell 60 days on London at ¾ per cent. premium, and buy at ¾ per cent. discount.

FRANCE.

(Le Commerce.)

PARIS, May 15, 1873—*Metallurgical Affairs.*—In France the decline is now an accomplished fact; it forced itself upon the people as a necessity of the situation, and most of the metallurgical establishments have fairly come before the public with price lists, showing a reduction upon preceding ones. Do not, however, let those who work iron yield to illusions. Let them be fully impressed with the fact that the period of yielding prices which we are traversing is but a passing one, and that it will bring back to market crowds of commands that had completely disappeared since the commencement of the year. It would be a fatal error, on the other hand, if producers of the raw material were, upon the first revival, to deem it expedient to return to previous exorbitant figures. Industries dependent on Iron cannot go on paying the high rates that had been unwillingly paid for the raw material, and a fair compromise between extremes has to be maintained. Should the iron masters shut their eyes to this truth, and insist upon a return to the old exorbitant rates, many tool and machinery shops will be closed, rather than work them for the producer of the raw material alone. This more particularly has reference to the industry of our iron founders for house-building purposes, which has been paralyzed by high prices—contractors preferring stone floors the moment Iron outruns a certain limit of cost. This is equally applicable to the case of Iron versus Wood for beams, &c. The same relates to railway and tramway (horse car) undertakings. While Iron was held at an extreme value a great many companies stopped further purchases and have lain idle ever since, in hopes of a general break down in Iron values. As regards Iron for marine purposes, the state of affairs has come to such a point that our merchant marine is getting to be limited in its ranks from the same cause. Our shipowners cannot buy abroad, and place vessels under the French flag without an onerous duty. They do not wish to build wooden vessels, and Iron is too high at home to construct them of this material. The consequence is that freight carrying passes into the hands of competing nations, unless we decline sufficiently to build vessels of French Iron.

(Le Commerce.)

PARIS, May 22, 1873.—*Iron.*—As we proceed, the decline in prices seems to be more generally accepted as a necessity of the times. The leading newspapers devoted to metallurgical interests, which had at first resisted the downward movement, have shifted, and are now unanimous in advocating lower prices. Even the Bulletin of the Committee of French Forges now endorses the same tendency, notwithstanding its pretending that Iron is well sustained at Paris, despite the little building done in the metal at present. Although in the Champagne a lower price list has been generally adopted, there seems to be no eagerness yet to buy, and the probability is that another lowering will be deemed imperative in order to attract business. In the North of France the situation is pretty much analogous, which does not prevent fresh capital being invested in several large furnaces and forges about to be erected.

HOLLAND.

(Diederichs Brothers.)

AMSTERDAM, May 13, 1873.—*Tin*—Banca Tin has continued to pursue its downward course. No transactions are reported, and it would be difficult to sell at 82¼ guilders. Billiton Tin afloat and spot is held at the same figure.

(Koch & Vlierboom.)

ROTTERDAM, May 20, 1873.—*Metals*—In Tin but few transactions have transpired, auction conditions, from 82½ down to 81½ guilders, and deliverable from the next fall sale at 80¾. *Bronze*—45 to 47 guilders the 50 kilos. *Lead*—Steady at 14¾; Stolberg and Eschweiler; German, 14¾ to 14½ guilders. *Iron*—English, 10½ to 13; Swedish, 14 to 15½; Siberian, 16; Scotch Cast ditto, 4 to 4¼ guilders—everything the 50 kilos.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending June 3, 1873:

Hardware.

Bruce & Cook, Casks, 1
Boker Hermann & Co. Arms, cases, 21; Mdse. pkgs., 1
Cockayne J. W. Casks, 2
Cattnach J. Chains, cks., 2
Dickinson Henry Cases, 3
Degraw, Aymar & Co. Chains, 16; cks., 11
Field A. & Co. Chains, cks., 30; Cases, 3; Anvils, 60; Packages, 8
Fuller Pros. Packages, 3; Anvils, 70
Green Hannibal, Chains, cks., 9
Hutchinson J. W. Cases, 1
Hilger & Sons, Cases, 4
Hayden & Tompkins, Packages, 4
Lloyd, Supplee & Walton, Casks, 6
Lewis & Long, Casks, 5; Cases, 1
Laughland & Co. Wire, cks., 5
Moss F. W. Files, cks., 5
Mason John W. & Co. Wire rope, coils, 8
Miller, Morrison & Co. Packages, 3
Merchants Dispatch Co. Guns, cs., 4
Moller A. & Co. Wire, cks., 3
Peace Chas. Packages, 5
Quackenbush, Townsend & Co. Casks, 2
Russell & Erwin Mfg. Co. Files, cks., 2
Robbins C. & Son, Cutlery, cases, 2
Squires Lewis L. & Sons, Wire rope, coils, 8
Schoverling & Daly, Mdse. pkgs., 1
Tillotson L. G. & Co. Gal. Wire, lots, 745
Turner R. A. Mdse. pkgs., 11
Van Wart & McCoy, Anvils, 115; Chains, cks., 4; Cases, 7; Mdse. pkgs., 37
Von Cleff Bros. Mdse. pkgs., 24
Witte John G. & Bro. Mdse. pkgs., 6
Ward Aaline. Mdse. pkgs., 2
Order. Casks, 8; Cases, 1

Iron.

Bussing, Crocker & Co. Pig, tons, 520
Baiz A. & Co. Scrap, tons, 55
Bruce & Cook, Sheet, bdls., 192
Cooke Jay & Co. Scrap, lbs., 131,301
Congreve Chas. & Son, Rails, 1081
Douglas Jas. Scrap, tons, 2
Griswold J. A. & Co. Pig, tons, 230
Henderson Bros. Pig, tons, 800
Lang W. Bailey & Co. Rails, 397; Fish plates, bdls, 420
Lawton & Lenox, Bale ties, lots, 661
Laughland & Co. Haybands, bdls., 408
Milliken S. Jr., Rods, bdls, 323
McColl Duncan, Scrap, cks., 15
Naylor & Co. Fish plates, bdls, 842
Oothout Wm. Bar, bdls., 262; Scroll, bdls., 243
Reeves, Osborne & Co. Scrap, tons, 54; lbs., 989
Smith G. A. & Co. Old rails, lots, 1; Double headed rails, 1821
Whitney A. R. Rails, 106; Bars, 694
Order. Sheet, bdls., 350; Rails, 2316; Scrap, tons, 530; Hoop, bdls., 21

Steel.

Abbott & Howard, Cases, 38; Bundles, 75
Cockayne J. W. Bars, 25; Bundles, 95; Cases, 14
Drexel, Morgan & Co. Rails, 1308
Frasse P. A. & Co. Cases, 1
Frith Edward, Cases, 21
Hogan John, Casks, 9; Cases, 61; Bundles, 27
Jackson Wm. Bundles, 61; Cases, 2
Moss F. W. Cases, 10; Bundles, 154
Naylor & Co. Tires, 12
Sanderson Geo. & Co. Bundles, 25; Casks, 3; Cases, 12
Slagg Joseph, Mdse. pkgs., 3
Wardlow W. C. Cases, 19; Bundles, 214
Order. Bundles, 1570

Metals.

Bruce & Cook, Tin plates, bxs., 606
Brown Bros. & Co. Copper, cases, 121
Bertschmann J. Tin plates, bxs., 1495
Dickerson J. B. & Co. Tin plates, bxs., 3214
Hart L. & Co. Tin, ingots, 300
Jones & Loughran, Lead, pigs, 262
Lamater H. Lam. zinc, cks., 115
McColl Duncan, Scrap, cks., 3
Naylor & Co. Tin plates, bxs., 718
Phelps, Dodge & Co. Tin plates, bxs., 7481
Reeves, Osborne & Co. Scrap, copper, lbs., 460; Scrap brass, lbs., 187
Wessels, Geo. Scrap, tons, 180
Order. Tin and terne plates, bxs., 578; Lead, pigs., 4922; Spelter, plates, 4996; Zinc, bbls., 250

The Greenleaf Foundry, at Brightwood, Ind., is partly completed, the roof having been placed on the main building, which is 300x50 feet. Machinery is being moved to this part of the building as rapidly as possible. There will be two additions to this main building, one being 200x50 feet, and the other 100x50 feet. This establishment will be one of the largest in the West.

Our English Letter.

Review of the British Iron, Hardware, and Metal Trades.

(From our Regular Correspondent.)

SHEFFIELD, Eng., May 19, 1873.

High prices have already—and that not by any means too soon—begun to tell their own story, and as I write this, reports are before me recording a diminution of current activity—as well as a still greater falling off of orders—on all sides. South Wales is the single district whence no complaint emanates, a fact easily accounted for, seeing that there the order books have got enormously in arrears, owing to the time lost over the great strike. All the great Welsh works are busy, rails being firm at £12, so far, but with a falling tendency evident. From Aberdare Works, last week, rails have been sent to Helsingfors and Antwerp; from Rhymney to Riga and Rio de Janeiro, and from Dowlais, one of the usual consignments of 1000 tons to New Orleans. Generally speaking, a good business is being done in Wales in bars and sheets for Holland, rails for Australia, Denmark, America, Sweden and Russia, and good lots of bars and bundles have been despatched to Smyrna. The great lots of Spanish hematite ore which had accumulated at Cardiff are now fast disappearing, some going to Sheffield, and others to Middlesboro, etc. The total quantity shipped from South Wales in April was 20,482 tons, mostly made up of steel, rails and iron. The tin plate trade remains brisk at prices quoted last week. A paragraph has gone the rounds of the press, stating that the Welsh colliers in the Ruabon neighborhood refused to work on Saturday last, owing to an almanac prophet, Zadkiel, having foretold a calamity on that day! I don't believe the statement, the probability being that these miners, like others of the class, merely refrained from working in order to keep the output under control. Miners, whether English or Welsh, are not such fools as some people would have us suppose. At Birmingham and in South Staffordshire trade is, to say the utmost, not very active. Orders cannot be procured at quoted prices, and although there are exceptional instances in which makers have given way, list prices are not at present any lower. Manufacturers assert that with fuel, pigs and labor at the current rates, they are quite unable to reduce quotations for finished iron, although they would most gladly do so were the step practicable. As a consequence, some of the mills are already beginning to run short time, and some firms intimate their intention to stop altogether, rather than run the risk of losing money. Pig-makers appear determined to uphold THEIR figures, so that between the two parties, whose interests are really and unmistakably identical, the trade is being brought to a deadlock as flat and uninteresting as ever was the "place down in Lincolnshire" created by the fertile brain of Dickens. The London merchants, whose commissions not uncommonly exercise a powerful effect upon the Staffordshire and Birmingham markets, are fighting shy of the high prices, and will not buy hoops at over £14, sheet at £18, and bars at £14. These offers do not tempt the best houses, being at least a couple of pounds each under the list, but, as a matter of fact, some firms and their old merchant connections are trying to effect a compromise, which will, I may add, usually be found in favor of the producer. The hollowware makers and iron founders of Birmingham have reduced their discounts 5 per cent. on some goods, and those sold at net prices advanced 7½ per cent. Goods sold by weight are put up 30s. per ton. The tube makers, for steam, gas and water, are busy, new works being in course of erection at Wednesbury and at Walsall. Wolverhampton makers of cabinet and till locks are clearing out large orders for the East Indies and other foreign markets. The gun trade is fairly busy, two or three buyers from the United States having been at Birmingham during the week, without, however, having placed any very large orders. Barrels are 7/ per pair and 6/6 for skelp tubes. The railway wheel, axle and carriage works continue to be well employed, as also are machinists and engineering work. Somebody evidently intends being able to "raise the wind," if we are to rely upon reports speaking of the great demand that exists for house bellows! Galvanized iron roofing is in request for exportation, No. 20 guage corrugated being £25 f. o. b. In North Staffordshire bars are quoted at £13.10, but inquiries recently made are believed to have resulted in sales at a lower price. At Sheffield there is no great change to report, all the principal steel firms being hardly less active than hitherto, whilst cutlery orders from the States are conspicuous by their absence. I know that two or three firms are doing pretty well in table cutlery; but I have some reason for believing that they are cutting prices tolerably fine to enable them to go. The joiner's tool manufacturers are on the point of revising their price list, and have already held a preliminary meeting to that end. All the Sheffield engineering firms, foundries, forges and mills, are busy, and a very good business is being done by the heavy iron works. The gun founders are busy on Birmingham barrel orders, and for the German, Italian and British governments. The Cleveland trade is likely to be paralyzed by a threatened strike of ironstone miners, otherwise the district is fairly prosperous. In Scotland warrants have recovered a shilling or two, but there is hardly any change in maker's brands. Prices are: Gartsherrie, No. 1, 135/; No. 3, 117/6; Coltness, No. 1, 137/6; No. 3, 117/6; Summerlee, No. 1, 135/; No. 3, 116/; Carnbroe, No. 1, 124/; No. 3, 116/; Langloan, No. 1, 140/; No. 3, 116/; Calder, No. 1, 140/; No. 3, 117/6; Glengarnock, No. 1, 125/; No. 3, 117/6; Eglinton, No. 1, 117/6; No. 3, 115/; Dalmellington, No. 1, 116/; No. 3, 115/; Carron, No. 1, 135/; Shotts, No. 1, 135/; No. 3, 117/6; Kinneil, No. 1, 125/; No. 3, 115/; Govan, No. 1, 115/; No. 3, 114/. In Barrow-in-Furness some good American orders for steel rails have just been placed, there being, previously, some heavy Canadian indents in course of execution. Several trade disputes exist—amongst others the file grinders' strike at Sheffield, which will, I think, be compromised. Metals are duller, and prices are falling slightly. Copper and tin are both lower. Chili bar, after falling to £84. 10/, has, however, recovered to £85 to £86 for good ordinary brands, Wallaroo being £91 to £92 cash. English is nominally unchanged. At the Swansea ticketing, on Tuesday, the aggregate sales of copper ore amounted to 3032 tons, which realized £14. 17/2 per ton. As compared with the previous sale, there was a reduction of 1/6½ in the price per unit, and of £7. 9. 5 in the standard calculated for 9 per cent. In Straits tin there has been rather more activity, at £135 to £136, cash. Banca is quoted 82 florins in Holland. English is £2 lower than last week. Spelter is steady at late quotations. London rolled zinc is selling at £32 to £32. 5. Lead is firm, at £23. 10/ to £23. 15/ for soft English. Quicksilver is now quoted £14 per bottle.

The financial crisis which is now in process at Vienna does not stand much chance of being repeated in this country, but one large failure, that of Newmann, Gingold & Co., of 9 St. Mary Axe, London, with liabilities amounting to £300,000, has occurred. The assets are wonderfully small, merely some £15,000. The leading journal, apropos to this, very pertinently asks: As the existence of this firm dates only from 1869, and they have never acquired any particular standing, it would be important for the commercial world to be informed of the conditions under which they have contrived to become debtors to the amount of £300,000. It is possible a satisfactory explanation may be at hand, but in the absence of particulars the affair seems extraordinary. If the sum in question was represented by bills, who were the parties that were found willing to discount such paper? Is it held chiefly by a single establishment or by a number, and is the kind of trading upon which this paper may be supposed to have been based receiving support in London to any general extent? The fact that for many months past the shipments of goods to distant markets have, in a majority of cases, been reported to have left a loss, and that there have meanwhile been no symptoms of the diminution of mercantile activity that should have been concurrent with this state of affairs, renders it critically necessary to ascertain if banks and discount establishments are exercising sufficient vigilance. Several recent failures have warranted a suspicion that some increased rigidity of tone on the part of those whose duty it is to watch the course of the discount market would be salutary, and it is to be hoped that in all future instances of suspension the accounts will be fully laid before the public, so that cases of unavoidable commercial misfortune shall be made clearly distinguishable from reckless financing under encouragement from reckless bill negotiators. These remarks are of such force that I think them worthy of general application, especially as some American firms are understood to be interested in this particular instance.

Some of your host of readers will, I have no doubt, peruse with no little interest the following article on cutlery, etc., at the London Exhibition, which I take from *The Times:*

The cutlery, or, to speak correctly, the steel manufactures, cutlery, and edged tools, at the Exhibition, fill four rooms in one of the galleries of the Albert Hall. There is not a very fine show; and we did not observe much which cannot be seen any day of the year through shop windows. However, there are four rooms full, and a quantity of goods of excellent workmanship has been brought together. Messrs. Mole, of Birmingham, show a case of presentation swords, gorgeously scabbarded in gold and velvet. They send also some Royal javelins, as well as others of the more modest pattern which pertains to the office and dignity of sheriff. Some of these latter have evidently seen service, for the blades are heraldic with the esquire's crest, and historic with the numeral of his year of shrievalty. The same firm deals in the sterner weapons of boarding pikes and cavalry lances, also in the more prosaic matchets used to cut down sugar-canes. A large case of needles, fish-hooks, curiously and cruelly barbed harpoons, etc., bears the name of Messrs. Bartleet; and Muller Brothers show a cabinet of watchmakers' tools, some of the broad files cut to a grain so fine that it escapes the eye, the steel feeling smooth as silk when laid against the hand. Then there are saws of so minute a tooth that one wonders how they can be of any use, a beautiful little lathe, and some clock chains, a study of workmanship in their intricate links. Some steel jewellery by Jean Wurder, of Brussels, is quite new and pretty; and Kirby, Beard & Co.'s case of Birmingham needles and fish-hooks could furnish forth implements to stitch every imaginable fabric, from a sack to a cambric handkerchief, and to catch every imaginable fish, from a whale, or, at least, a shark, to a minnow. Stuart & Smith's Sheffield grate and fireplace is a blinding blaze of the shining steel which is at once the pride and the torment of housemaids; and the axe-heads, augers, and other tools by Gilpin, of Cannock, are of good pattern. The vine-leaf dessert spoons and grape scissors in Messrs. Mappin and Webb's case, which are not steel, but silver-gilt, are very pretty; and Messrs. Blaize show knives and razors in all their stages, from the rough black chunks of iron and steel to the keen and brightly-finished blade. Messrs. Wilkinson, of Pall Mall, exhibit a shirt of mail made of myriads of split-rings, tempered every one of them, and put together by hand. These iron shirts are even at the present day manufactured for exportation to some parts of Africa and America. Another case of goods, by Mappin & Webb, has the usual many-bladed penknives, with a show corkscrew, remarkable for its fine and well-worked worm. A case full of curious old locks and keys is from the museum on the other side of Exhibition Road. Mr. John Neal's pyro-silver cutlery stands in shining ranks, the blades being coated with a preparation asserted not to lose its sheen, even when steeped in vinegar. Messrs. Wilkinson exhibit a number of their regulation swords arranged crosswise with their scabbards in an ingenious double rack; also, a scimetar of a beautiful grain, labeled "finest black Khorassan steel." The same firm show sword blades and hilts in all their processes; also blades which have taken strange fractures in the proving; and the Royal United Service Institution sends a bayonet in the 49 distinct processes needed to perfect some inches of a rude metal bar into the "glittering horror of the steel-topped" breech-loader. Sir Joseph Whitworth sends a pair of barrels for a shot-gun. They are made in his metal, and are remarkable as being in one piece, not turned separately and fixed together. A case of Chinese cutlery is full of queer-shaped razors, kitchen-cleavers, and scissors, and contains even a little knife used for shaving the inside of the ear. These wares are more curious than excellent. On the other hand, if a jury of burglars could master their natural feelings, they would, doubtless, add another to the medals won by Chubb's and Hobb's locks. The latter firm show some keys and lock-plates ornamented with really beautiful work in steel and brass. Thomas Hill fills a cabinet with his daintily-finished skates, and a pair with the prettiest gilt heels and toes in the world are enough to induce any lady to learn the use of them, if only for the pleasure of adding such an ornament to her equipment. Unwin & Rodgers send a case of their excellent wares, ranging from blades of the simple and useful sorts and sizes to ingenious and deadly breech-loading pistol knives. Spear and Jackson, of Sheffield, are the makers of a great circular saw (a dazzling disc of steel seven feet or so in diameter), and of spades, shovels, and other agricultural tools. In Stevenson and Mawhood's case we see Sheffield axes made in the American shape and fitted with the American handles used all over the Australian colonies, in which English manufacturers have let a great trade slip out of their hands. The stores of Sydney and Melbourne are stocked with American shovels, American buckets, and, above all, with American axes; and a bushman would as soon think of felling a tree with a flint implement from the drift as with an axe of English pattern. The English axe-head cuts into the wood and sticks there, but the rounded wedge of the States knocks away a chip as a plate and bounds back ready for the next stroke. No doubt these axes could be made cheaper in England than in America, yet the English manufacturers have allowed the Americans for years and years to monopolize the Australian market. We hope that we may take this case of Messrs. Stevenson as a sign that Sheffield means no more to allow herself to be beaten out of trade which she could easily make her own. She is also, we may note, considerably behind America in the matter of shovels. The remaining articles which the visitor will notice in the cultery rooms are a table set with the heads of Shrapnell shell, shown in the different stages of their make, from the open saucer, which has a fine vibration when struck, to the closed conical missile ready for charging. There is a stand of Swedish steel rifles and guns. This collection can make no pretence whatever to novelty or completeness, but it contains a quantity of goods arranged in very handsome cases, and is worth walking through.

The Custom House annual returns for the year 1872 have just been issued. From them we learn that in that period there were 13,198,494 tons of coal, cinders, and patent fuel, of the declared value of £10,442,321, exported from the United Kingdom; the coal amounting to 12,712,231 tons, of the value of £9,858,418. France took 2,152,527 tons; Germany, 2,074,622 tons; Italy, 898,468 tons; Russia, 771,255 tons; India, Straits Settlements, and Ceylon, 518,653 tons; Egypt, 509,719 tons; Spain, 501,599 tons; Denmark, 637,706 tons; Sweden, 486,763 tons; Holland, 468,424 tons. The coals, cinders, and patent fuel shipped coastways, from port to port of the United Kingdom, amounted to 10,155,858 tons in 1872. The coals brought into the port of London amounted to 7,565,516 tons—viz., 2,548,818 tons coastways and 5,016,598 tons by inland navigation and by railway.

These figures show that the modern Babylon—which is, as Artemus Ward expressed it, "popular noospaper frase," for London—took more than half the quantity of coal exported as detailed above. At the resumed sittings of the Coal Commission, Mr. Joseph Pease, M. P. for South Durham, was under examination. He stated that he was connected with several of the collieries in the North of England. He had been personally connected with collieries for the past twenty years. The mines with which he was connected produced in 1870, 1,300,000 tons of coal; in 1871, 1,370,000 tons; and in 1873, 1,360,000 tons were produced. In 1870, the mines worked 219 days; in the course of the year 1871, they worked 300½ days; and in 1872, they worked 292 days. In one of his pits 194,000 tons of coal were obtained in 1870; in 1871, 182,000 tons; in 1872 only 151,000 tons were obtained. In the year 1870 the miners worked 173 days; in the year 1871 they worked 128 days, and in 1872 they worked 113 days. In 1870 the hewers worked 7½ hours a day; in 1871 they worked seven hours, and in 1872 they worked only about six hours per day. The pit he had been speaking of was not worked the full six days per week. In 1870 the hewers averaged 5·89 tons per day; in 1871, they averaged 5·77 tons; and in 1872 they averaged 5·70 tons per diem. In 1870 the men employed about the pit averaged 258 days work per year each man; in 1871 the average was also 258 days per year; but in 1872 the average was 244 days per year. The earnings of the men employed about the pit averaged, in 1870 4/2 per day each day they were worked, which equalled £52. 15/. In the course of the year, in 1871, the earnings averaged 4/ per day; and in 1872 the earnings averaged 6/7½ per day, or £81. 1/11 per year. During the first three months of the present year the earnings of the hewers averaged 7/2 per day, and if they continued to work the same number of days as they did last year, they would be able to make £105 per annum. In 1870 the highest earnings of the men employed were 5/4 and 4/9 per day, and the lowest earnings were 2/8, 2/7, and 2/6 per day for hewers. Those prices which he had mentioned to the Committee showed the difference between a good and bad workman. The same proportion was very much maintained in 1871, the average being 5/8, 6/6, and 7/9 for the best workmen, and 3/10, 2/10, and 2/6 for the worst. In 1873 the hewers earned 6/7, 6/1, and 6/ per day for the best workmen, and the lowest earnings received were 3/5, 3/4, and 3/3 per day. For the first three months of the present year the earnings of the hewers had averaged 9/9, 9/6, and 9/4 for the best workmen, and 4/7, and 4/8½ for the worst. The hewers had to supply themselves with candles out of their own wages. At the present time the hewers worked about 10 days per fortnight, and about six hours to the day, and received £2. 2/ per week. The royalties which had to be paid by the colliery owners had largely increased of late. Royalties which were 4d. or 5d., were now about 1/ per ton. The price of coals at the pit's mouth in 1870 was about 7/6 per ton. In 1871 the price was about the same; but in 1872 coals fetched 13/6 per ton, and even more than that, at the pit's mouth. He had made returns for the present year, but would not vouch for their general accuracy. However, he believed they were as accurate as it was possible to get them. At the present time the coals were selling at from 22/ to 23/ per ton that were used for the best household purposes. About 3300 men were employed on the mines upon which he was interested. A large number of the miners who were employed in Durham were the old miners, who would not remove from the places on which they were working, but there were a certain clique—only a small number—who would remove. The coal owners started an association in the year 1872. The association did not meet at stated times, but only by special summons, and then they only discussed serious and material points. He thought that in 1871 the iron works took 60 per cent. of the production, whilst in 1870 they only took in his district, 114,000 tons. In fact, he thought that a good deal of what would otherwise have been exported went to the iron works. Altogether, in the pits owned by his firm, there was a diminution of 47 days per annum, or 100,000 tons; and he accounted for the rise in prices by the rate of demand having increased beyond the ratio of supply. There was certainly, in his opinion, no understanding or combination amongst the coal owners to keep up prices, and thought that the average price in future would be greater than it had been before. The next evidence was that of Mr. Alexander McDonald, president of the Miner's National Association, who went fully into details as to wages. He affirmed that up to a year or two back wages in the Scotch mines were excessively low; in fact, families that had come from the agricultural districts could not hold together; the wives and children went back to the place whence they came, and the men emigrated to America. He himself had seen many of them at the mines he had visited between the Atlantic and Pacific. He thought that wages here and in America were about on a par. One cause that had reduced wages in Scotland of late was the fact that at least 500 men, attracted by high wages, had returned from America. They, or many of them, came over for the winter, and returned for the run, as the passage could be done in fifteen days, and they could get return tickets for £10. At a later stage of the examination the chairman asked Mr. McDonald if he thought that mines in America were worked with as great a regard to the safety of the men as in England, to which the latter replied that in some cases they are, but as up to 1869 there was no mining law in many districts, there was not the same care. As to whether the American iron districts were likely to draw away much labor from England, that depended on the rate of wages, as the men here now understand political economy, and will go wherever they can obtain the highest renumeration. The strikes in America were not the cause of the men coming here. There might be 2/ per day in favor of America, but 1/ per day less comfort—if comfort can be estimated by money, which was hardly possible. In America clothes cost the miner much more, and also some kinds of food and other things. He admitted the great benefit conferred upon both sides by arbitration. One or two other witnesses were afterward examined, but their evidence was not of great weight.

The Development of Electricity in the Belting of Factories.

Electricity, although it has been performing wonders, seen and unseen, since the creation of the world, and although its outer manifestation has awed man in the storm and delighted him in the aurora, has only within a comparatively few years been studied, utilized, and its destructive effects neutralized. Several grand descriptions of the effects of electric action occur in the book of Job, and there is one notable expression (ch. 37, v. 22): "Fair weather cometh out of the north; with God is terrible majesty!" This seeming inconsistency of fair weather from the north, when the worst storms of this hemisphere come from the northeast, and the disagreement of the first part with the latter part of the text, can all be made clear when it is known that the Hebrew word translated "fair weather," should be rendered *resplendence*; and then the poetical allusion is the northern aurora, and its showing forth the majesty of the Creator.

The ancients, however, knew nothing of the wonders that were hidden under the splendid outward appearance, any more than they were aware of the marvelous, invisible world which the microscope has revealed to us; and yet they were favored with more miraculous manifestations of the beauty and grandeur of this power than appeared in later years; for to the writer it seems that the flaming cherubim mentioned as guarding the "Tree of Life," the appearance to Moses of the burning, unconsumed bush, the pillar of fire that led the Israelites, the descent of flames at the command of Elijah, and others, as well as the fluttering appearance of a dove, and the cloven tongues of fire mentioned in the New Testament, were the actions of this force or essence to perform the commands of the Almighty, and to symbolize His will.

Volta, with his experiments on the muscles of dead frogs, and Franklin, with his immortal kite, were the van of the army of philosophers and inventors whose persistent efforts have finally been crowned by the wonderful magnetic telegraph, which is doing more to change the mode of civil government and to alter the whole civilization of the world than any invention ever made by man.

It is therefore not out of place, nor is it unworthy our attention, to study the various minutiæ of development which this all-pervading "life-force," as it has been aptly termed, often presents; and although many phenomena, formerly hidden, are now fully explained by the agency of the subtle essence, there still remains unexplored a wide domain of invention and discovery in the future. One of the peculiar developments of electricity which, it appears, has received but little real attention, though often noticed in a casual manner by those who did not fully comprehend the power that lurks in the little corruscating spark, is the subject of our present consideration.

An observant person, who remained for awhile in almost any kind of factory, could not fail to observe the electricity which is generated by the friction of leather belting on pulleys, and from other causes. It is true that many employed for years in such factories do not appreciate the quantity and power of this essence, produced immediately around them, nor the importance of considering whether it is worthy of observation and study, with a view to discover the exact mode of the generation thereof, and the probability of its prevention. It is well known how the friction of a leather cushion, covered with an amalgam of mercury and tin, and impinging on a glass cylinder, forms the electric machine. Here the glass roller is the smooth surface which, by friction, generates the electricity and delivers it to the points of the metal conductor. In exactly the same manner the smooth-turned surface of an iron pulley acts with the belt traveling rapidly over it, except that the essence is retained or stored in the belt, and the more rapid the motion the greater will be the quantity of electricity developed. The grease and dirt frequently accumulating on these belts assist in causing and increasing the phenomena.

Let anyone favored with hair of average length stand uncovered under one of these rapidly traveling belts running from one to two feet above his head, and he will feel very sensibly the passing into him of the subtle agent, as "each particular hair" streams upward to meet and conduct the electricity. The writer has often observed a workman whose post was in such a situation, and whose long gray hair stood straight up under the attraction, and surrounded his head like a nimbus. Were proper wires placed to conduct, and cylinders provided whose surface would store, the electricity, a large quanity could be accumulated; or it could be conducted away in safety. As it is, so little attention is paid to this that large belts are suffered to run charged with the powerful agent, and long sparks spring from them to any object approaching near enough. Or let anyone place himself on an insulated stool, and hold his hand to a belt thus in motion; spark after spark will enter his body, and with the other hand he can fill a Leyden jar, light a candle from his finger, or perform any other experiment that could be done with an electric machine.

In the present reign of the fire-king, as shown by the numerous conflagrations which have drained our nation of about $300,000,000 during the past two calendar years, it becomes a duty to observe and consider the habitudes of any subtle force produced in a secret manner, and to inquire whether there is any probability that through it the number of fires has been increased. Many cotton and woolen mills have been burned from mysterious causes, often leading to the belief that incendiarism was practiced by the owner, or by others, when, if the truth had been known, the cause just indicated was sufficient to originate the disaster. It is well known that dry pine wood, long heated to a high temperature, will become ready at the slightest provocation to burst into flames; which fact, if we may be allowed the digression to a kindred subject, will explain the numerous fires arising from "defective flues" in churches, stores, and dwellings. These flues being frequently made of tin, and not always of the best quality, in a few years become rusted and eaten in holes; and the heat from a furnace streaming through said apertures and impinging on a joist, wainscot, plaster-lathing, or partition in immediate contact, will soon produce fire without the agency of any direct flame. Especially will this happen if, as is often the case, the heat, being shut off from above, is forced out partly through an insufficient or half-open register, and partly through the rust-holes in the flues. The mere conducting of heat would probably never cause the deterioration of tin or sheet iron flues. It is the want of care during the spring, summer and autumn, when damp air is allowed to settle in them, which occasions disaster. If proper precautions were taken, by having the flues so arranged as to be open to inspection, or taken down and placed in dry situations during the period not used, fires from this cause would become almost unknown.

To return to our subject: as regards danger from electricity in belting, it is well known that these belts generally run near the ceiling, the warmest part of a room. In cotton or woolen factories there are often stored away on shelves, or slats, hung from the joists, large quantities of thin, light strips of pine wood, the supports of cotton or worsted heddles used in weaving—generally the heddles are there also, often varnished—parts of cotton warps; and in such places there are usually added piles of rubbish of various kinds, often covered with a thick coating of cotton or woolen flyings from carding and spinning machinery. Now it is easy to perceive how these light pine strips, becoming thoroughly dried by months or years of expoure to a high temperature, come to resemble "punk"—and together with the cotton varnished heddles, and the flyings thereon, offer a most favorable opportunity for an electric spark from a belt immediately over or adjoining to set the whole in a blaze at any moment. The writer has seen many such "tinder-boxes," as they might well be called, in what were really first class mills; and in some cases the counter or main belts running directly over such shelves or slats, filled in the course of years with an accumulation of rubbish, seldom looked at, and probably never cleaned. Having also received strong shocks from highly electrified belts, he is able to judge, in some degree, of the probability of danger arising from the source indicated. Many woolen mills have been burned from the use of the hot blast wool drying machine, having steam pipes enclosed in a wooden box, with a fan below to force the hot air through the wool. In case of such accident, the theory generally was that, from neglect, particles of wool had been allowed to accumulate on the pipes, and were ignited by the intense heat. But the circumstance that these fires occurred almost always just after the machine ceased working, and also burst out suddenly over the whole machine and the room which contained it, points to the fact that the light wood of the box enclosure had, by long exposure to intense heat, become highly receptive of ignition, and the electricity of the fan-belt, moving at a high rate of speed underneath, was constantly forced into the small space along with the hot air. The motion of the fan having ceased, and heat still remaining in the pipes (such was invariably the case by neglect), there was no sufficient escape for the heat and electricity which, condensed in so small a space, acted almost like gunpowder when the moment favorable for the operation arrived; and this, without any undue amount of dirt or droppings on the pipes or floor, which waste, it is well known, would smoulder or burn slowly, rather than burst suddenly into extensive flames. In proof of this, it has been found that precisely the same kind of machine, even when the dirt and waste from the wool is allowed to accumulate, will not take fire when the hot air is conducted from a heated room at a short distance, and when the fan is driven by a belt above the machine instead of from below. It is the firm conviction of the writer that excessive heat alone would never cause the sudden and extensive fires that generally arise from such machines, but that it is due to an explosive or superheated quality imparted to the confined air by the electricity generated, either from the driving belt or by some other cause.

Another development of electricity in woolen mills arises from the friction of the woolen slubbing as it is being condensed or rubbed between the sliding rollers on the front of the condenser card. This is often a source of great perplexity and trouble to the carder, and becomes an occasion of loss and damage to the manufacturer; as the strands of woolen roping issuing from the rollers attract one another, unite and break, causing detention of work, and considerable waste. So much does some carding suffer from this cause that, where no other preventive is at hand, lamps are constantly burned under the condensing rollers, or water freely sprinkled upon them; and the former arrangement, though it in a great degree neutralizes the effect of the electricity, certainly adds to the danger of fire in the card room. To mitigate this nuisance, steam pipes, perforated with minute holes, are often used in first class mills; but, although the jets of steam thus thrown on the rollers "kill" the electricity, their use cannot be expected to be an advantage to the machine or the card-wire. Many attempts have been made to invent rollers and conductors to carry off this superabundant electricity, and prevent loss of work and waste, but thus far without any practical result. It is, however, not to be supposed that a necessity which offers a favorable field for invention will not before long be supplied. The use of lamps, sprinkling of water, and perforated steam pipes are but palliatives; what is wanted is the eradication of the evil.

In the majority of fires that have destroyed cotton and woolen factories, it was in the picker room that the fire originated; and the friction of journals, and pieces of metal passing through the picker along with the cotton and wool, have been alleged to be the most frequent causes of the disaster. It is undeniable that such are usually the cause of fires, and nothing can guard against such accidents except the use of sheet iron sheathing inside the room, and having the picker house in a detached building, which arrangements are now generally insisted upon by all underwriters. To show, however, that the causes above named are not all that are to be feared, the writer will state that he has seen small pieces of iron, equal to a handful of nails, pass through a picker, making a long streak of flame in front, without igniting the wool that was being crowded through the machine.

There is reason to believe that, especially in cotton picker rooms, more danger exists from the development of electricity through the rapid revolution of leather belts, than will be credited or admitted by most manufacturers. These belts must run at a very high rate of speed, and as at certain times the air is much more heavily charged with electricity than ordinarily, which may give occasion for the disaster, so it can also account for the immunity from accident that may exist for a long time. A picker room filled with flyings, which are oftened festooned on joists, walls, and posts, or whirling around hangers and shafts, presents a most favorable opportunity for fire when a highly charged belt is spitting out its clicking sparks of electricity.

Doubtless many fires which have been attributed to incendiarism, or to nails, &c., passing with the cotton and wool, should be ascribed to the cause we have indicated. To protect picker rooms, hose, buckets of water, and steam pipes, to throw live steam from a bolier, are generally insisted upon as precautionary measures, but entire safety cannot be expected until some device of pointed wires and rods be arranged to carry off the superabundant electricity from these most exposed localities.

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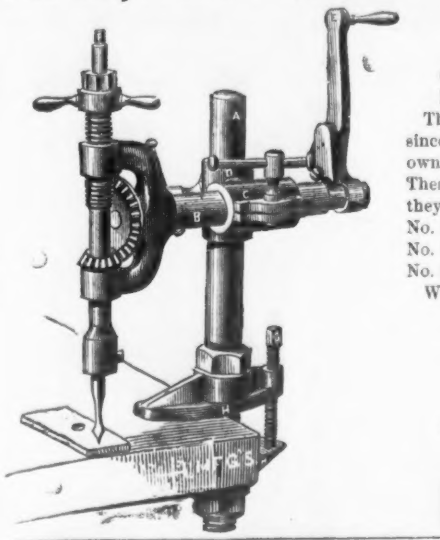

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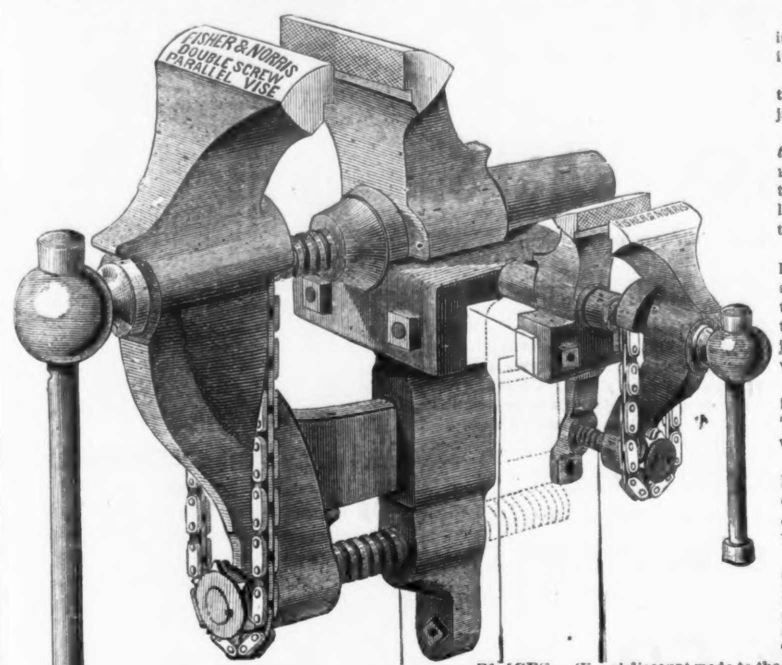

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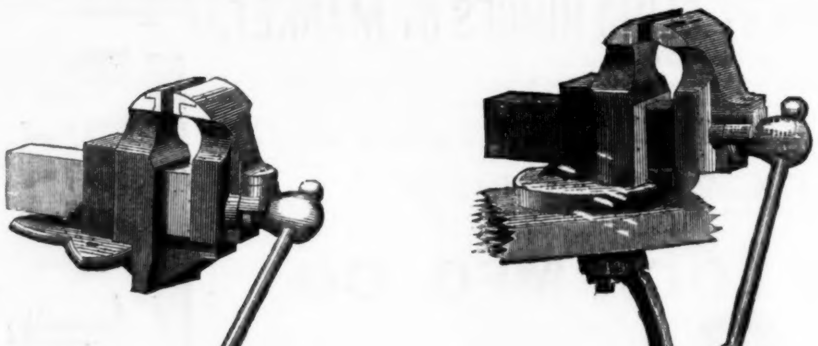

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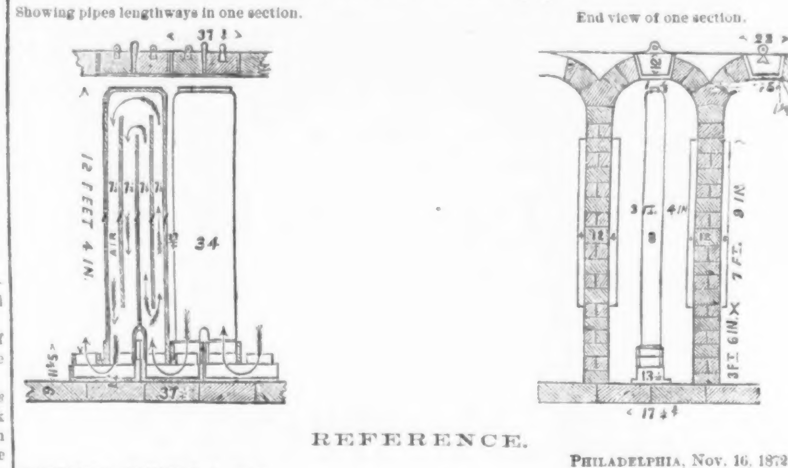


REFERENCE.

PHILADELPHIA, Nov. 16, 1872.

PAULDING, KEMBLE & CO.:

GENTLEMEN: We have five sections of the "Ford's" Ovens in use since blowing in our new Furnace on the 21st of October. The Ovens have given entire satisfaction; we consider them superior to any Cast Iron Oven in use; they heat the air to a greater degree with much less gas and heat on the brickwork than the Player Ovens; they cost less for construction, and, we believe, will prove more durable, and less expensive to keep in repair. Our main difficulty thus far has been to keep the heat down to 1000 deg.; our average is from 1100 to 1200 deg.

In all cases the Cast Iron Key Boxes to form the arch should be filled in lightly with fire-brick blocks, laid dry and covered with loam, or, *better*, a cast iron plate, to cover the top, with a ring in it, so as to be easily removed.

We built our ovens in one block, entirely of *fire brick;* the cost of the brick work entire was about 5000 dollars, say about 1000 for each oven.

We put 4 courses of fire-brick in the bottom, laid on a loose slate rock, laid dry, and well grouted each course with Kaolin grout.

We can recommend the Ford Ovens with great confidence to iron men who wish to construct the best kind of ovens in use in the United States. Yours, truly, J. B. MOORHEAD & CO.

P. S.—Our Furnace is now on her 3d week, making about 28 tons per day good Foundry Iron—15 feet bosh, 50 feet high.

The Hart, Bliven & Mead Mfg. Co.,

18 & 20 Cliff Street, and 243 & 245 Pearl Street, New York.

Factories at KENSINGTON, CONN.

MANUFACTURERS OF

CARRIAGE HARDWARE.

Every style of Bands & Sockets in Silver, Nickel, Oroide & Gold Plated.

NEW YORK SCREW BOLT WORKS.

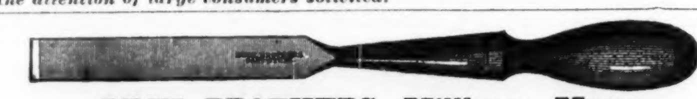
(Estate of R. J. DEWHURST, deceased.)

JOHN COCHRANE, Executive Agent and Manager,

Office and Works, cor. Ave. D and 11th St., N. Y.

Bolts, Nuts, Turnbuckles, Washers, Forgings, &c

The attention of large consumers solicited.



BUCK BROTHERS, Millbury, Mass.

Largest Stock and Best Assortment in the United States of

Shank and Socket Firmer Chisels.

Also, BEST QUALITY SOCKET FRAMING CHISELS.

ALFRED FIELD & CO.,

Foreign Hardware

Commission Merchants.

PRINCIPAL OFFICES,

Birmingham, England, Nos. 66 & 67 Parade.
Sheffield, England, No. 23 Westfield Terrace.
New York, U. S., Nos. 47 John and 5 Dutch St.

BRANCH OFFICES,

Philadelphia, Cincinnati, New Orleans and Montreal.

Shipping Office,

Middleton Building, No. 1 Rumford St., Liverpool.

VAN WART, SON & CO.

Hardware Commission Merchants,

BIRMINGHAM, - ENGLAND

AGENTS

VAN WART & McCOY,

43 Chambers Street, New York.

GEORGE H. GRAY & DANFORTH,

48 India Street, Boston.

F. W. TILTON,

17 Old Levee Street, New Orleans.

At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for the

John Rimmer & Son's Celebrated Harness and other Needles.

OSCAR IRVING VAN WART & Co.,

FORWARDING AGENTS,

2 South John Street, LIVERPOOL.

New York Wholesale Prices, June 4, 1873.

HARDWARE.

Anvils.
Solid Cast Steel....₩ lb 14c
Wright's....₩ lb gold 12½c; over 250 lbs 13c, gold
Armitage's Mouse Hole....gold 13c
Wilkinson's....₩ lb gold 11½c
Eagle Anvil Co. ₩ lb 12c....dis 15 @ 15&5 %

Apple Parers.
Turn Table / Lightning / Reading / Conqueror....} $8·50 ₩ doz
Union....₩ doz $8 00 @ 8 50
Bay State, Paring, Coring and Slicing....13 00 @ 15 00
Skeleton....10 00
Climax Slicer....9 00
Bay State Peach Parer....$11 00 @ 11 50
Lightning "....11 00 @ 11 50
Peach Stoner and Halver....6 00

Augers and Bits.
Snell Mfg. Co....dis 15 %
Russell Jennings....dis 10 %
Douglass Mfg. Co., Extra....dis 25&5 %
" No. 1....dis 40 %
" Hollow Augers....dis 25 %
Cushman's Expanding Hollow Augers....dis 20&10 %
Ives'....dis 25 %
" Hollow Augers....dis 25 %
" Expansive Augers....dis 25 %
" " Bits....dis 25 %
Andrews' Bits....dis 20 %
Cook's Patent Augers....dis 25 %
" " Bits....dis 25&10 %
Shepardson's Double Cut Bits....dis 25 %
Griswold's Patent....dis 25&10 %
Cast Steel Cut Augers....new list dis 15 %
" Auger Bits....dis 25&10 %
Long Augers....new list dis 10 %
Bonney's Patent Hollow....$48 per doz—dis 30 %
Stearns'....$48 per doz—dis 30 %
Morse's Bit Stock Drills....dis 30 %

Axes.
Blood's....$12 50 @ 14 00
Hunt's....₩ doz $15 00 @ 17 50 net @ dis 5 %
Collins'....₩ doz 12 00 @ 16 00 net @ dis 5 %
Hurd's....₩ doz 13 00 @ 15 00
Schweitzer Mfg. Co.'s....₩ doz 13 00 @ 15 00
Simmons'....₩ doz 13 00 @ 15 00
Morris'....₩ doz 13 00 @ 15 50
Red Jacket....₩ doz 13 00 @ 15 00
Mann's....₩ doz 12 00 @ 11 50
Powell Tool Co., "Peerless"....₩ doz 13 00 @ 15 00

Balances.
Chatillon's / Frary's / Morton's....} new list dis 15 %

Bands.
Plated....add 10; dis 5 %
Iron....dis 15&5 %
Brass (Plated list)....dis 10 %
Oroide....add 15; dis 5 %

Bells.
Hand, Light Brass....dis 65&10 %
White Metal....dis 15&10 %
Globe....dis 10 %
Abbe's....dis 25 %
Taylor's Patent Door....dis 25 %
Western Gong....net list
Brook's Gong....dis 25 %
" Pull....dis 25 %
Hart Mfg. Co., Crank and Pull....dis 15 %
Cow—Common Wrought....new list dis 33⅓ %
Western....dis 25 %
Kentucky "Star"....dis 15 @ 15&10 %
Dodge's Genuine Kentucky....new list dis 25 %
Yaw's Genuine....dis 25 %

Bellows.
Blacksmiths'....dis 10 %
Moulders'....dis 30 %

Blind Fasteners.
Van Sand's....₩ gross $14 00
Washburn's Patent....₩ gross 14 00
Merriman's....add 35 @ 40 %

Blind Staples.
Boardman's Patent, ⅜ in. and larger....₩ lb 37½c
" " ¼ in....₩ lb 45c

Bolts.
Cast from Barrel, Shutter, &c....old list dis 30&10 %
Wrought Iron Barrel....dis 60 %
" Square....dis 60&10 %
Carriage and Tire, Common....dis 65&10 %
" Norway Iron....dis 60 %
Star, Philadelphia....dis 15 %
Eagle, Philadelphia....dis 15 %
Philadelphia Pattern, P. S. & W....dis 10&10 %
Carriage and Tire, R. B. & W....dis 50&5 %
Plow, R. B. & W....dis 25 %
Stove, R. B. & W....dis 25 %
Union Nut Co....dis 25 %
Machine....dis 25 %

Boring Machines.
Kellogg's....dis 10 @ 15 %
Snell Mfg. Co., Rice's Patent....dis 25 %
" Regular....dis 25 %
Douglas Mfg. Co....dis 20 %
Bovey's Angle....$6 00 @ 6 25
" Upright....4 25 @ 4 50
Mortising Machines, each....

Braces.
Barber's Patent....dis 20&10 %
Wilson Mfg. Co....net @ dis 5 %
Spofford's Patent....dis 37½ %
Noble's Patent....dis 15 %
Bartholomew's....dis 20 %
" Patent....dis 20 %
Q. S. Backus & Co....dis 30&10 %

Bung Hole Borers.
Common and Ring....dis 20 %
Enterprise Mfg. Co....dis 20 %
Ives' Tap Borers....dis 25 %

Butchers' Cleavers.
Bradley's....dis 15 %
Beatty's....dis 15 %

No.	1	2	3	4	5	6	7	8
	$19·00	$21·50	$24·00	$27·00	$30·00	$33·50	$36·50	$40·00

Hart Mfg. Co....dis 45&10 %

No.	1	2	3	4	5	6	7
	$25·25	$29·75	$30·25	$38·75	$43·55	$49·50	$54·00

Butts.
Wrought Brass....new list dis 10 %
Cast Fast Joint, Narrow....dis 15 %
" " Broad....dis 15 %
Cast Loose Joint....dis 25 %
" " Mayer....dis 25 %
" " Parliament....dis 25 %
Loose Pin Butts, Plain....dis 25 %
" " Japanned....dis 25 %
" " National....dis 25 %
Wrought Fast Joint, Narrow....dis 25 %
Wrought Broad....dis 25 %
" Loose Joint....dis 25 %
Wrought Table and Back Flaps....dis 25 %
Cast Butts, Ohio Butt Co....dis 25 %
" Narrow Fast Drilled and Wire Jointed (old list)....dis 10 %
" Broad....dis 25 %
" Broad Loose Drilled....dis 25 %
" Silver Tipped....dis 25 %
" Loose Joint, Japanned....dis 25 %
" Acorn and Silver Tipped....dis 25 %
Palmer Blind Butts....dis 30&10 %
Nicholson Blind Butts....dis 30 @ 35 %
Parker's Blind Butts....dis 25 %
Clark's Blind Butts....dis 25 %
Seymour's....dis 25 %
Shepard's....dis 25 %
Gretton's....dis 25 %
Standard....dis 20&10 %
Union Mfg. Co.'s Drilled Fast Narrow....new list dis 25 %
" " Broad....dis 25 %
" " Loose....dis 25 %
Whitney & Wait's Bronze Metal....dis 25 %

Caps—Percussion, per 1000.
G. D....40c
Ely's E. B....[illegible]
Double Waterproof....[illegible]
Colt's....[illegible]

Cartridges.
Metallic....dis 20 %

Cards.
Horse and Cary....dis 25&10 %
Cotton....dis 20 %

Castors.
[illegible]

Chain.
Coil....net gold
[illegible]
Galvanized Pump Chain....
[illegible]

Chalk.
White....₩ gross, 63c
Red....₩ gross
Blue....₩ gross
Crayons....₩ gross, 14c

Cherry Stoners.
Family....₩ doz $9·00

Chisels.
Socket Firmers....dis 60&5 @ 60&10 %
Socket Framing....dis 60&5 @ 60&10 %
Socket Corner....dis 20 %
Tanged Firmers....dis 50 @ 60 %
Butcher's....$5·50 to £ gold—new list
Newbould's....$5·50 to £ gold—new list
Spear & Jackson's....$5·50 to £ gold—new list

Clips, Axle.
Norway or Best....dis 30 @ 35 %
Superior....dis 40 @ 40&10 %
"Star," Superior, Philadelphia....dis 40 %

Coal Shovels.
Iron Handled....₩ doz, $ 85 @ 1 25
Wooden Handled....₩ doz, 1 00 @ 2 00

Coal Hods.
Smith, Burns & Co....dis 15 %

No.	14	15	16	17	18	
Japanned	9·75	10·50	12·00	13·50	12·50	per doz
Galvanized	13·00	14·50	15·50	17·50	19·50	

Cocks.
Brass Racking....dis 10&10 %
Lock and Globe....dis 10&10 %

Coffee Mills.
Common Board and Box....dis 15&10 %
Better grades....dis 5 %
Increase Wilson's....new list dis 25 %

French Steel....dis 10 @ 20 %
"Champion"....dis 20 %
Swift's....dis 20 %

Compasses and Dividers.
Bemis....dis 15&15 @ 20&5&15 %
Excelsior....dis 30 %
Peck, Stow & Wilcox....dis 20 %

Coopers' Tools.
Bradley's....dis 15 @ 20 %
Chas. E. Little....dis 15 @ 20 %

Corn Knives and Cutters.
Bradley's....list net

Crucibles.
Gautier & Co....₩ No. 5½c

Curry Combs.
Hotchkiss' and Kellogg's, Iron and Brass....dis 10&5 %
Fitch's....dis 20 %
Ruggles'....dis 15 @ 20 %
Rubber....₩ doz, $9·00—dis 10 %
Schweitzer Mfg. Co....dis 20 %

Curtain Pins.
Silvered Glass....dis 40&10 %

Cutlery.
American Table....
American Pocket....dis 15 %

Door Springs.
Torrey's Patent....$7·50 ₩ doz—dis 20&10 %
J. Palmer....₩ doz $5·50
Challenge.—
Japanned....₩ doz $4 00 @ 6 00
Bronzed....₩ doz 5 00 @ 7 00
Nickel Plated....₩ doz 6 50 @ 9 00
1 Gross lots....dis 10 %
5 Gross lots....dis 20 %

Drawing Knives.
....dis 60 @ 60&10 %
Bradley's....dis 25 %

Drills.
Ingersoll's Ratchet....dis 25 %
Moore's Triple Acting Ratchet....dis 20 %

Egg Beaters.
Monroe's....₩ doz net $8·25 @ 8·50
Ashley's....₩ doz net 2·25 @ 3·00
Earle's Patent....₩ doz net 5·50 @ 6·00
Pratt's Aerating....dis 10 %
Dover....₩ doz net $6·00

Emery.
Genuine Chester—Regular Nos....₩ lb 8c } dis 5 %
" Flour and FF....₩ lb 5c }
Washington Mills—Regular Nos....₩ lb 8c
" Flour....₩ lb 5c

Enameled and Tinned Ware.
Kettles....dis 10 %
Sauce Pans, Glue Pots, &c....dis 5 %

Faucets.
Cork Lined, Wood....dis 55&10 %
Fenn's....dis 50 %
" Cork Stops....dis 40 %
Star....dis 55&10 %
Frary's Patent Petroleum....dis 10&10 %
Taylor's Pattern "....dis 20&10 %
Wood and Metallic....dis 40 %

Files.
American Best....$5 00 to £ net
Nicholson—Mill....5 00 to £ net
" Others....5 00 to £ net
" Tapers (single cut)....5 00 to £ net
Newbould's....5 50 to £ gold
J. & Riley Carr's....5 50 to £ gold
Stubs'....8 50 to £ gold
Butcher's....5 50 to £ gold
Spear & Jackson's....5 50 to £ gold
Hargreaves, Smith & Co.'s....4 75 to £ gold
Jowitt's....5 25 to £ gold
"Western"....5 00 to £ net
W. K. & C. Peace's "Imperial"....5 25 to £ gold
R. Ibbotson....5 00 to £ gold
Beam & Murray, "Cyclops"....4 85 to £ gold
Fisher's....4 75 to £ gold
Goodlad's....4 00 to £ gold
Moss & Gamble....5 25 @ 5 50 to £ gold

Fluting Machines.
Acme....$7 00 each net
Cole....5 75 each net
Manville, No. 2....7 00 each net
Knox, with 4-inch Rolls....5 00 each net
" " 6 "....6 00 each net
O. K....6 50 each net
Peerless, 4-inch Rolls....4 00 each net
" 5 "....5 60 each net
Excelsior, No. 1....4 75 each net
" No. 2....6 50 each net
Diamond....7 50 each net
Climax 7-inch Rolls....8 00 each net
" 4½ "....6 50 each net
Empire....4 00 each net
Eureka, No. 1, 7-inch Roll....8 00 each net
" No. 2, 5-inch Roll....6 00 each net
K. F. M., 4-inch Roll....5 50 each net
" 6-inch Roll....6 00 each net
Carpenter's Self-Heating....13 50 each net
Fairy, Self-Heater....10 00 each net
National, 5-inch Rolls....5 00 each net
Myer's Fashion Fluter, 4½-inch Rolls....3 00 each net
Ponton Fluter, Bright....$1 50—dis 25 %
" " Galvanized....2 00—dis 25 %

Fry Pans.
Tinned....dis 20 %

No.	0	1	2	3	4	5	6	7	8
₩ doz	$3·00	3·25	3·62	4·00	4·50	5·00	5·50	6·00	7·50

Peck, Stow & Wilcox....dis 20 %
Smith, Burns & Co., "Excelsior" Polished....dis 20 %

No.	1	2	3	4	5	6	7	8
₩ doz	$3·70	4·00	4·70	5·30	6·00	7·00	8·00	9·00

Hammers.
Maydole's....new list net
Cheney's....new list net
Verree....dis 5 %
Yerks & Plumb....new advanced list dis 5 @ 10 %
Emmet Hammer Co....dis 10 %
Minot & Co....dis 15 %

Handles.
Hammer and Hatchet....dis 10 %
Quakertown, Axe, Pick and Sledge....dis 10 %
" Hammer and Hatchet....net
Greensboro', Axe, Pick, Hammer, &c....dis 10 %

Harness Snaps.
Judd's....dis 30 %
Fitch's....dis 30 %

Hatchets.
Isaiah Blood....dis 10 %
Shingling, Nos. 1 2 3....₩ doz $7 50 8 00 8 50
Claw, " 1 2 3....₩ doz 8 50 9 00 9 50
Lathing, " 1 2 3....₩ doz 7 50 8 00 8 50
Hunt's....net
Shingling, Nos. 1 2 3....₩ doz $7 25 8 00 8 75
Claw, " 1 2 3....₩ doz 7 75 8 50 9 25
Lathing, " 1 2 3....₩ doz 7 50 8 25 9 00
Hurd's....dis 20 %
Shingling, Nos. 1 2 3....₩ doz $8 00 8 50 9 00
Claw, " 1 2 3....₩ doz 9 00 9 50 10 00
Lathing, " 1 2 3....₩ doz 8 00 8 50 9 00
Newark's Edge Tool Co.'s....dis 25 %
Shingling, Nos. 1 2 3....₩ doz $6 50 7 00 7 50
Claw, " 1 2 3....₩ doz 7 25 7 75 8 25
Lathing, " 1 2 3....₩ doz 6 50 7 00 7 50
Yerks & Plumb....dis 10 %
Shingling, Nos. 1 2 3....₩ doz $7 00 7 50 8 00
Claw, " 1 2 3....₩ doz 7 50 8 00 8 50
Lathing, " 1 2 3....₩ doz 7 00 7 50 8 00
Simmon's....dis 10 @ 15 %
Shingling, Nos. 0 1 2 3....₩ doz $7 50 8 00 8 50 9 00
Claw, 1 2 3....₩ doz 9 00 9 50 10 00
Lathing, 1 2 3....₩ doz 8 00 8 50 9 00
Broad, 1 2 3....₩ doz 9 00 10 00 12 00
" 4 5 6....₩ doz 14 00 16 00 18 00
" 7 8....₩ doz 20 00 22 00
Elephant....dis 15 %
Shingling, Nos. 1 2 3....₩ doz $8 00 8 50 9 00
Claw, " 1 2 3....₩ doz 9 00 9 50 10 00
Lathing, " 1 2 3....₩ doz 8 00 8 50 9 00
J. P. Verree & Co....dis 5 %
Shingling, Nos. 1 2 3....₩ doz $7 00 7 50 8 00
Claw, " 1 2 3....₩ doz 7 50 8 00 8 50
Lathing, " 1 2 3....₩ doz 7 00 7 50 8 00

Hinges.
Wrought Strap and T....dis 15&10 %
Providence Plate....{6 and 8 in. list 11c, over 8 in. list 9½c}....dis 5 %
Screw Hook and Strap....{8 & 10, 12 in. 8½c; 14 to 36 in. 7½c}....net

Hoes.
Solid Shank, C. S....₩ doz $8 00—dis 20 @ 25 %
Socket....₩ doz 9 00—dis 20 @ 25 %
Riveted Eye....₩ doz 5 00—dis 20 @ 25 %
Grub....dis 20 %
Planters'—Wilasted....add 10 %
" Scovill....add 33⅓ %
Scovill Pattern (Wilasted)....add 20 %

Hooks.
Belt....dis 50 %
Bench....₩ doz $8 00 @ 8 50
Wardrobe, Japanned....new list dis 10&10 %
Hat and Coat "....new list dis 10&10 %
Wrought Staples and Hooks and Staples....dis 60 %
Wrought Hasps and Staples and Hasps, Hooks and Wrought Staples....dis 60 %
Screw Hooks and Eyes, revised list....dis 60&10 %

Horse Nails.

Putnam's.

No.	5	6	7	8	9	10
	32c	28c	26c	25c	24c	23c

In lots 2000 lbs. dis. 5 %.

Ausable.

No.	5	6	7	8	9	10
	30c	27c	25c	24c	23c	22c

In lots of 1000 lbs., 5 % discount.

Brundage.

No.	5	6	7	8	9	10
	29c	26c	24c	23c	22c	21c

In lots of 500 lbs., dis. 5 %.

American Pressed.

No.	5	6	7	8	9	10
	22c	20c	20c	20c	20c	20c

Perkins Finished (ready to drive).

No.	5	6	7	8	9	10
	29c	26c	24c	23c	22c	21c

Buffalo Forged.

No.	6	7	8	9	10
	28c	26c	25c	24c	23c

Globe (Pointed and Polished).

No.	5	6	7	8	9	10
	31c	28c	26c	25c	24c	23c

In lots of 1000 lbs., 5 % discount.

National (Pointed and Polished), Extra Finish.

No.	5	6	7	8	9	10
	30c	27c	25c	24c	23c	22c

In lots of 1000 lbs., dis 5 %.

Vulcan.

No.	5	6	7	8	9	10
	33c	30c	28c	27c	26c	25c

In lots of 500 lbs., 5 % discount.
" 1000 lbs., 7½ % discount.

New London Horse Nails.

No.	6	7	8	9	10
Great Western	27c	25c	24c	23c	22c
U B	29c	27c	26c	25c	24c

In lots of 1000 lbs., dis 5 %.
Star Brand....₩ lb 16c
Morgan....16c

Horse Shoes.
Burden....₩ keg, $6 37½
Shoenberger....₩ keg, 6 37½
R. I. Horse Shoe Co., Perkins Pattern....₩ keg, 6 37½
" " R. I. Pattern....₩ keg, 6 87½
Mule Shoes....₩ keg, 7 37½

Kettles.
Enameled....dis 10 %
Brass....₩ lb 50c
In lots of 500 lbs....₩ lb net 45c

Knives.
Butcher and Shoe, "Ames'"....dis 15 %
Butcher and Shoe, "Wood's"....dis 5 % cash
Hay and Straw, "Wadsworth's"....dis 15 %

Knobs.
Base—Common....net
" Plush Tip....dis 10 %
" Elastic End....reduced list dis 10&10 %
Trenton Lock Co....dis 40 %

Lanterns.
Brady's Patent....dis 10 %
Ætna....dis 10 %
Yankee....dis 10 %
De Beque....dis 10 %

Locks and Latches.
Cabinet—Eagle....dis 25 %
Cabinet—Gaylord....dis 25 %
Trunk....dis 10 %
Continental....dis 15 %
Shepardson's....dis 20 %
Trenton Lock Co....dis 40 %

Meat Cutters.
Dixon's (P. S. & W.)....dis 5 %

No.	1	2	3	4
₩ doz	$14 00	$17 00	$19 00	$30 00

Hales'....dis 25 %

No.	11	12	13
₩ doz	$27 00	$33 00	$42 00

Perry's Champion (P. S. & W.)....dis 5 %

No.	200	300	400
₩ doz	$22 00	$27 00	$40 00

Woodruff's (P. S. & W.)....dis 5 %

No.	100	150
₩ doz	$15 00	$18 00

American....dis 25 @ 25&5 %

No.	1	2	2½	3	4	5
Each	$6 00	$9 00	$14 00	$15 00	$30 00	$75 00

Molasses Gates.
Stebbins' Pattern....dis 60&10 @ 70 %
Tinned ends....dis 40&10 %
Weed's Patent Self-Boring....dis 15 %
" without Auger Bit....dis 40 @ 50 %
Patent Self-Measuring....per doz $42 00—dis 20 %

Mouse Traps.
Wood Choker....₩ doz holes, 16 @ 18c

Nails.
10d Cut (Standard)....See Trade Report.

Nuts and Washers.
Cold Cut Nuts....3c off list
Hot " "....3c off list
Washers (as to quality)....less 3c @ 6c off list

Oil Stones.
Washita No. 1....₩ lb 22c @ 25c
" Slips....₩ lb 44c @ 50c
Hindostan....₩ lb 7c
" Slips....₩ lb 10c net

Oilers.
Olmsted's....dis 25&10 %
Broughton's....dis 25&5 %
Common Zinc, Brass and Copper....dis 20 %

Picks.

	1	2	3	4	5	
Washoe R. R. Nos. ₩ doz	$14·00	15·00	16·00	17·00	18·00	
Washoe Coal, "	$8·50	9·00	10·00	11·00	13·00	15·00

Picture Nails and Knobs.
Richards' Patent....dis 40 @ 40&10 %

Planes.
Auburn Bench and Fancy....dis 15 %
Bailey's Patent Adjustable....dis 15&10 %
Howland's Bench and Fancy....dis 15 %
Chapin's " " "....dis 15 %
" 2d quality....dis 15&5 %
Sandusky Tool Co....dis 15 %
"Ogontz"....dis 15&5 %
Plane Irons....list net
" Butcher's....$5 50 to £ gold—new list
" Spear & Jackson's....5 50 to £ gold—new list
" Sandusky Tool Co....list net

Pumps.
Douglas Cistern, etc....new list dis 25 %
" S. & F....new list dis 20 %

Rakes.
Cast Steel....dis 25 %

$8 00	9 00	10 00	11 00	
8	10	12	14	teeth.

Razor Straps.
Genuine Emerson (B. F. Badger)....dis 33⅓ %
Hunt's....dis 25&10 %
Chapman....dis 10 @ 15 %

Rivets.
Iron and Tinned....dis 25 %
Copper Rivets and Burrs....dis 10 %

Rods.
Stair....new list dis 25 %
American Patent....dis 25 %

Rope. Manufacturers' List.
Manila....½ inch and larger ₩ lb 18½c
"....⅜ inch ₩ lb 19c
"....¼ and 5-16 inch ₩ lb 19½c
" Lath Yarn....₩ lb 19½c
" Hay Rope....₩ lb 19c
Jute....₩ lb 12c
Sisal....½ inch and larger ₩ lb 16c
"....⅜ inch ₩ lb 16½c
"....¼ and 5-16 inch ₩ lb 17c
" Hay Rope....₩ lb 16½c

Rules.
Boxwood and Ivory....dis 60&10 %

Sad Irons.
....₩ lb 5½ @ 6c

Sand Paper—dis 7½ @ 10 %
Beader & Adamson's (Flint) 00 to 1½....$4 50 ₩ ream
" " " 2, 2½ & 3....5 00 "
Assorted....4 50 "
Star....₩ ream $3 50
Emery....₩ ream $7 00 @ 12 00

Sash Locks.
Clark's....dis 25 @ 30 %
Ferguson's....dis 20 @ 25 %
Champion....₩ gross $13 00 @ $15 00
Norwich....dis 15 %

Sash Weights.
Solid Eyes....₩ lb 3c

Sausage Fillers.
Perry's (P. S. & W.)....dis 5 %

No.	1	0
₩ doz	$15 00	$21 00

Saw Rods.
....list net

Saws.
Spear & Jackson's....$4 50 to £ gold
John Spear....$3 60 to £ gold
Am. Saw Co....new list
Perforated Cross Cuts, all kinds....68c ₩ foot
Inserted Tooth....dis 10 %
All else....dis 12½ %
Disston's Cross Cut, Circular and Mill....dis 12½ %
" Hand, Panel, Back, &c....dis 7½ %
Butcher Bow Saws, Butcher Saw Blades, Hack Saw Blades....dis 12½ %
H. W. Peace's Circulars....dis 10 %
" Other kinds....dis 10 %
Wm. McNiece's Hand, Cross Cut and Circular....new list dis 10 %
Lightning....new list dis 20&12½ %

Scales.
Brown's....dis 25&5 %
Fairbanks'....new list dis 15 @ 20 %
Howe's....dis 15&5 %
Shattuck's Counter and Union....dis 15 %
National Platform....dis 25 %
Eureka....dis 25 %
Scale Beams....dis 20 %
No. 1 300 to 1200 lbs....90c ₩ cwt
No. 2 " "....75c ₩ cwt

Screws.
American list of April 1, 1873.
Flat Head Iron....dis 47½ %
Round Head Iron....dis 45 %
Flat Head Brass....dis 60 %
Round Head Brass....dis 50 %
Round Head Silver Capped....new list dis 20 %
Patent Gimlet Point Coach and Hand Rail....dis 10 %
Bed....list net

Scythes.
Blood's German Steel, Grass....₩ doz $9 00
" Cast " "....₩ doz 10 00
" Silver " "....₩ doz 11 00
" German " Grain....₩ doz 13 00
" Cast " "....₩ doz 14 00
" Red Rover....12 00
" Young America....9 50
" Silver Clipper....12 63
Scythe Snaths....dis 20 %

Shears.
Cast Steel....dis 60&10 %
Conn. Cutlery Co., new brand....dis 60 %
Rowe's....dis 50&10 %

Shovels and Spades.
Ames....list July 1, '70, list net @ dis 2½ %
Rowland....new list Feb. 8, '73, dis 20 %
Old Colony....dis 2½ %

Shovels and Tongs.
Iron Head....list net
Brass Head....dis 5 %
Polished Steel....new list dis 15 %

Slates.
Square Frames, Round Cornered, by case....dis 60&10 %
Less than a case....dis 50 @ 55 %
Oval Frames, by case....dis 40 @ 40&10 %
Less than a case....dis 30 %

Spoons.
Iron....new advanced list, dis 10 %
By the case....dis 20 %
Britannia....dis 25&10 %
Plated A 1....dis 25&5 %
German Silver....net @ dis 5 %
Tinned (P. S. & W.)—
Teas....$1·50 ₩ gross, net
Tables....2·75 " net

Stocks and Dies.
....dis 15 %

Stove Polish.
Joseph Dixon's....₩ gross, $6 00 @ 6 25
Gold Medal....₩ gross $5 50

Squares.
Steel....dis 50 %; full cases, dis 50&10 %
Iron....dis 50 %; full cases, dis 50&10 %
Nickel Plated....add $2 50 @ $4 00 ₩ doz net
Try Squares and T Bevels....dis 45&10 %
Star Try Squares and Bevels....dis 20 %

Tacks.
Full Weight American Iron....dis 35&7½ %
Half Weight American Iron....dis 67½&7½ %
Carpet....dis 7½ %
Brads American Half Weight....dis 50&7½ %

	½	⅝	¾	1	1¼ in. and over
Finishing Nails ₩ lb	25c	20c	18c	14c	13c dis 7½ %
Trunk and Clout ₩ lb	25c	20c	18c	14c	13c dis 7½ %

Copper Tacks....₩ lb 56c—dis 7½ %
Iron Shoe Nails, ₩ lb 4-8 and longer, 10½c; 3½-8, 11c....dis 7½ %
Double Pointed....new list dis 33⅓ %

Tapes, Measuring.
American Flask and Cap Co....dis 10&10 %
Eddy's....dis 10&10 %

Toe Calks.
....₩ lb 12c

Tobacco Cutters.
Champion....dis 20 %
Peck, Stow & Wilcox....dis 10 %

Traps.
Newhouse....dis 17½ %
Hotchkiss....dis 20 %
Peck, Stow & Wilcox....dis 30 %
Blake's Patent....dis 15 @ 20 %

Vises.
Trenton Vises, Solid Box.
30 to 110 lbs....17c
111 to 160 lbs....18c
160 and over....21½c
Peter Wright's....₩ lb 15½c. gold
Wilson's Solid Box....dis 10 @ 15 %
39 to 160 lbs....18c
160 and upward....21c
Backus & Union, Parallel....dis 25 %
Buffalo, Parallel....new list dis 15 %
Fisher & Norris' Double Screw Parallel....dis 15 @ 15&5 %

Wire.
Bright and Annealed....Nos. 0 @ 18 dis 25 @ 30 %
" " ....Nos. 19 @ 26 dis 35 @ 40 %
" " ....Nos. 27 @ 36 dis 40 @ 45 %
Coppered....Nos. 0 @ 18 dis 20 @ 22½ %
Galvanized....dis 35 @ 40 %
Tinned....dis 15 @ 20 %
Cast Steel....5 @ 10 %
Tinned Broom Wire....dis 20 @ 25 %
Galvanized Telegraph, Nos. 8 and 9....₩ lb 10c @ 11c
" " " 10 and 11....₩ lb 11c @ 12c
" " " 12....₩ lb 11½c @ 12½c
Annealed Fence, Nos. 8 and 9....dis 25 @ 30 %
" Grape, " 10 to 14....dis 25 @ 30 %
Fence Staples....₩ lb 10c
Stubs' Steel Wire....$7 00 to lb gold

Wrenches.
Baxter's Adjustable "S"....dis 30 %
" Diagonal....dis 30 %
Collin's & Co.'s....new dis list 30 %
Coes' Genuine....dis 30&10 %
" Pattern (Wrought)....dis 45 %
" " (Malleable)....dis 50 %
Lindsay's Patent....dis 25 %
Taft's Pattern....dis 60&10 %
Davis' Patent Duplex....dis 40 %

METALS.

IRON.—Duty: Bars, 1 to 1½ cents per lb., Sheet, Band, Hoop and Scroll, 1½ to 1½ cents per lb. Provided, that none of the above Iron shall pay a less rate of duty than 35 per cent. Pig, $7 per ton; Polished Sheets, 3 cents per lb.; Wrought Scrap, $8 per ton; Cast Scrap, $6 per ton. All subject to a reduction of 10 per cent. Railroad, 70 cents per 100 lbs. Boiler and Plate, 1½ cents per lb.

Pig Iron—American.
Foundry No. 1....₩ ton, $48 00 @ 50 00
Foundry No. 2....." 46 00 @
Gray Forge....." 39 00 @ 40 00
White and Mottled....."

SCOTCH.
Gartsherrie....nominally " 56 00 @ 57 00
Coltness....." 58 00
Glengarnock....." 48 00 @ 50 00
Eglinton....." 46 00 @ 48 00

Bar Iron.
Am. Refined, at mill....₩ lb 3·9 @ 4c

Rails.
Welsh, gold....₩ ton, 70 00
American, at works, currency....." 80 00
Old Rails, D. H., currency....."

Scrap.
Wrought Scrap, from yard....." 47 00 @ 48 00

Bar Iron from Store.

Common Iron.
¾ to 2 in. round and square....₩ ton, $ 92 50
⅝x9-16 in " "....." 97 50
½ in. " "....." 100 00
2¼ to 3 in. "....." 97 50
1 to 6 in. wide x ⅜ and 1 in. thick....." 92 50
1¼ to 6 in wide x ¼ & 5-16 in. thick....." 97 50
1 and 1¼ in. x ¼ and 5-16....." 100 00

Swedish Iron.
1¼x⅜ and ½....." 185 00
1½x⅜ to ⅝, and ¾ square....." 180 00
1⅞ to 5x⅜ to ¾ and ⅞ to 2-in. square....." 175 00
6 to 12x⅜ and ½.....

Refined Iron.
¾ to 2 in. round and square....." 97 50
1 to 6 in. wide x ⅜ to 1 thick....." 97 50
1¼ to 6 in. wide x ¼ and 5-16 thick....." 102 50
1 and 1¼ x ¼ and 5-16....." 105 00

Large Rounds.
2¼ to 2¾, round and square....." 105 00
3, 3¼ and 3½ in....." 110 00
3¾ and 4 in....." 117 50

Rods—		
⅝ and 11-16, round and square	"	102 50
½ and 9-16, " "	"	107 50
7-16, " "	"	110 00
⅜, " "	"	115 00
5-16, " "	"	120 00
¼, " "	"	125 00
3-16, " "	"	145 00

Band Iron.
1 to 6 in. x 3-16 to No. 12....." 115 00

Horse Shoe Iron.
¾ and ⅞ x ⅜, to ½....." } 122 50
1 x ⅜, to ⅝....."

Ovals, Half Ovals and Half Rounds.
¾ to 1½....₩ ton, $122 50
⅝ and 11-16....." 127 50
½ and 9-16....." 132 50
7-16....."
⅜....."

Nail Rods
Best Norway....₩ lb 9½c

Norway Shapes
⅛ to 2 in. x ⅛ to ¾....." } 9c
⅛ to ¾ square....."

Norway Bar
⅜ to 2 in. square.

Spring Steel
1 to 4 in. wide....." 8½c

Tire Steel
⅝ to 1½ x ⅜ and 5-16....." 9½c
⅝ & 1 x 3-16....." } 9¾c
⅝ & 1 x ⅛....."

Toe Calk Steel
½ to ¾ x ⅜ to ½....." 8¼c

Plow Steel
6 to 16 wide....." 9½c

Sleigh Shoe Steel
¾ to 1½ x ⅜ to ⅝....Stock...." 7½c

Hoops,		
⅝ x No. 22	₩ ton,	$170 00
¾ x No. 20	"	142 50
⅞ x No. 19	"	137 50
1 and 1⅛ x No. 18	"	130 00
1¼ to 2 and 1x1⅛ x No. 13 and 14	"	125 00

Scroll Iron—		
½ x 12	"	145 00
½ x 10	"	140 00
½ x 3-16	"	135 00
½ x ¼	"	130 00
⅝ x 14	"	140 00
⅝ x 12	"	135 00
⅝ x 10	"	130 00
⅝ x 3-16	"	125 00
⅝ x ¼	"	120 00
¾ x 14	"	135 00
¾ x 12	"	130 00
¾ x 10	"	125 00
¾ x 3-16	"	120 00
¾ x ¼	"	117 50
⅞ x 14	"	130 00
⅞ x 12	"	125 00
⅞ x 10	"	120 00
⅞ x 3-16	"	117 50
⅞ x ¼	"	115 00

Sheet Iron.

		English.	American.
Nos. 10 to 20	₩ lb	6¼c	7½c
21 to 24	"	6¾c	7¾c
25 to 26	"	7c	8c
27	"	7c	8¼c
28	"	7¼c	8½c
30	"	8c	

Galvanized, 10 to 20....₩ lb 11½c
" 21 to 24....." 12½c
" 25 to 26....." 13½c
" 27....." 14½c
Patent Polished....." 15c
Russia, Nos. 8 to 11....₩ lb 20c
" Nos. 12 to 16....." 20c
Belgian....." 12½

One piece Corrugated Sheet Iron Elbows.

CHARCOAL IRON.

4½	5	5½	6	7 inch.
$3·75	4·25	5·25	5·25	6·50 per doz.

RUSSIA IRON.

4½	5	5½	6	7 inch.
$7·00	13·00	13·00	13·00	14·00 per doz.

Brass.
ROLLED AND IN SHEETS.
(Brown & Sharp's Gauge.*)
For the purchase of 100 pounds and over at one time:
HIGH BRASS.
All Nos. to No. 28, and widths 14 in. and under....42c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive....45c
Over 20 in. to 30 in. inclusive....48c
½c ₩ lb advance on each No. above No. 28 to 38, inclusive.
All Brass thinner than No. 38 is Platers' Brass at....61c
Sheets 24x48 in., and all sheets cut to particular sizes and lengths....46c
Printers' Rules....50c
Sheets wider than 30 in. and under 40 in....52c
" 40 in. and over....54c
Circular sheets, in diam. from 4 in. to 14 inclusive....52c
" " " over 14 in. to 20 "....55c
" " " " 20 in. to 30 "....58c
" " " " 30 in. to 40 "....61c
" " " " 40 in....64c

LOW BRASS.
4c ₩ lb more than High Brass.
Gilding Metals, 7c ₩ lb more than High Brass.
Platers' or Gold Metal { In Bars....5 / Sawed....5

FOR SLITTING: Metal in Width.
2 in. to ½ in., to No. 30, inclusive, 1c ₩ lb advance.
2 in. to 1 in., thinner than No. 30, 2c ₩ lb advance.
2 in. to ½ in., " " 30, 3c "
½ in. and less to No. 30, 2c ₩ lb advance.
½ in. and less thinner than No. 30, 5c ₩ lb advance.
10 % discount.

SCRAP—NEW METAL.
High Brass Scrap, 21 cents, net.
Low " 23 " "
Gilding, 25 cents, net.
Turnings, Filings and Chips, half the price of Scrap net.

BRASS AND COPPER WIRE.
(Stub's Wire Gauge).

	High Brass.	Low Brass.	Gild'g and Cop'r.
Nos. 0 to 20	45	49	56
Nos. 21, 22, 23	46	50	56
Nos. 24 and 25	47	51	57

Brass Wire straightened and cut, 4 cents advance.
10 % discount.

FINE WIRE—NET PRICES.

	High Brass.	Low Brass.	Gild'g and Cop'r
No. 26	0·47	0·51	0·57
No. 27	0·50	0·54	0·60
No. 28	0·52	0·56	0·62
No. 29	0·54	0·58	0·64
No. 30	0·56	0·60	0·68
No. 31	0·58	0·62	0·72
No. 32	0·62	0·66	0·77
No. 33	0·66	0·70	0·87
No. 34	0·70	0·74	0·97
No. 35	0·75	0·79	1·09
No. 36	0·84	0·88	1·21
No. 37	1·04	1·04	1·34
No. 38	1·24	1·34	1·64

Ten cents per pound extra for Spooling.

TUBING.
(Brown & Sharpe's Gauge.)
₩ lb
Plain to No. 20, inclusive....$0·60
Nos. 21, 22, 23, 2c. advance on List for each No.
Nos. 24, 25, 26, 4c. " " "
Above No. 26 special rates.
Plain Tube, 1-4 inch....76
" 3-16 "....1 61
" 1-8 "....1 86
All Mandrel-Drawn Tubes 5c. advance on List.
Fancy Tubing 4c. advance on List above Plain.
English, Scotch, and Extra Pattern Fancy Tubing to No. 20....
Tubing sawed or cut 2 to 4 ft. long, 2c. advance on List.
Add to two cents a half-cent for each additional cutting under two feet. 10 % discount.
Brass Door Rail, Polished—54 cents per lb.—10 %

BELT AND HOSE COPPER RIVETS AND BURS.

Price per lb	57	58	60	62	64	66	68	72	76c
Nos.	7	8	9	10	11	12	13	14	15

Braziers Rivets, 51 cents per pound, discount 10 %.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire.
4 per cent. 12 inch. to No. 26	0·70	0·85
6 " " "	0·80	0·95
10 " " "	0·95	1·15
15 " " "	1·05	1·30
18 " " "	1·15	1·45
20 " " "	1·25	

Discount 10 %.
German Silver Sheets over 12 inches wide and weighing more than 10 lbs....$2·00 ₩ lb net
Advance two cents for each additional inch in width above 12 inches, and two cents per pound on each No. thinner than Nos. 26 to 36, inclusive.
All German Silver thinner than No. 36 is Platers' at 50 cents per pound additional.
German Silver Scrap, one-third less than net price of 12 inch Market Metal; German Silver Turnings, Filings and Chips, half the price of Scrap.
* Brown & Sharp's Gauge is about two numbers finer than Stub's Wire Gauge.

COPPER.—Duty: Pig, Bar and Ingot, 5c.; old copper, 4 cents ₩ lb: Manufactured (including all articles of which copper is a component of chief value), 45 % ad valorem. All subject to a reduction of 10 per cent.
American Ingot....₩ lb 35½ @ 35c
English " ....." 30 @ 31c

SHEATHING, BRAZIERS' COPPER, BOLTS, &C.
Braziers Copper, ordinary sizes, over 16 oz., per square foot....45c. ₩ lb
Braziers' Copper, ordinary sizes, 15 oz. and over 12 oz., per square foot....48c. "
Braziers' Copper, 12 oz. per square foot and lighter....51c. "
Circles less than 84 inch in diameter....48c. "
Circles, 84 inch diameter and over....51c. "
Segment and Pattern Sheets....48c. "
Locomotive Fire Box Sheets....45c. "
Sheathing Copper, over 12 oz. per sq. ft....45c. "
" " 12 oz. ₩ sq. ft. and lighter....51c. "
Bolt Copper....45c. "
No Copper is Sheathing except 14x48 inches, and not to exceed 34 oz. to the square foot.

TINNING.
14x48, by the case....8c. ₩ sheet.
14x48, less than case....10c. "
Boiler Sizes, 7 and 8 inch....12c. "
" " 9 inch....15c. "
Other sizes not larger than 30x60....2½c. ₩ sq.
Larger than 30x60....5c. "
Copper Bottoms, 45c. ₩ lb.; 5 % discount.

O'NEILL'S PATENT PLANISHED COPPER.
14x48.
14 and 16 oz. and heavier....49c. By the case, 48c. ₩ lb
12 oz. and lighter....52c. " " 51c. "
Boiler Sizes.
7 in., 14x52. 8 in., 14x56. 9 in., 14x60
14 and 16 oz. and heavier....51c. By the case, 50c. ₩ lb
(And all sizes not over 20 inches wide.)
30x60
14 and 16 oz. and heavier....53c. ₩ lb
12 oz....56c. "

LEAD—Duty: Pig, $2 per 100 lbs.; old Lead, 1½ cent per lb.; Pipe and Sheet, 2½ cents per lb. All subject to a reduction of 10 per cent.
Spanish....@ 6¾c gold
German Refined....@ 6¾c gold
English....@ 7¼c gold
Bar....dis 10 %....9½c.
Pipe....dis 10 %....10½c.
Tin Lined Pipe....dis 10 %....16½c.
Sheet....dis 10 %....10½c.
Shot....dis 10 %. Drop, 11½c.; Buck, 12½c.

STEEL—Duty: Bars, Ingots, Sheets and Coils, valued at 7 cents per lb., or under, 2¼ cents; over 7 cents, and not above 11, 3 cents per lb.; over 11, 3½ cents per lb. and 10 % ad val. Railway Bars 1¼ cents per lb. Railway Bars, in part Steel, 1 cent per lb. All subject to a reduction of 10 per cent. Provided, that Metal cemented, cast or made from Iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as Steel.

American Cast Steel.
Tool....17c
Spring....13½c
Homogeneous....13½c
Tire....12½ @ 13½c
Machinery (round and square)....11½ @ 12c
File....12½c
Sheet....14 @ 16c
Saw Plate, mill and mulay....14 @ 16½c
Saw Plate, gang and X cut....13 @ 14c
" circular as to size....18 @ 30c

Chrome Steel.
Tool....₩ lb 20 @ 21c
Tool, extra fine....." 40 @ 75c
Spring....₩ lb 12c and upward
Machinery....₩ lb 14c.
Hammer....." 15c.
Gun or Homogeneous....." 16c.

English Steel.—payable in gold, dis 5 % cash.
" Best Cast....₩ lb 19½c
" Extra Cast....." 20½c
" Round Machinery, Cast....." 12½c
" Swaged, Cast....." 21½c
" Best Double Shear....." 19½c
" Blister, 1st quality....." 15½c
" " 2d quality....." 13½c
" " 3d quality....." 11½c
German Steel, Best....." 12½c
do Eagle....." 11½c
do 3d quality....." 10½c
Sheet Cast Steel, 1st quality....." 19½c
" " 2d quality....." 17½c

SPELTER—Duty: In Pigs, Bars and Plates, $1 50 per 100 lbs.—less 10 per cent.
Silesian, cash....8½ @ 8¾c., gold
American "....8 @ 11c., currency

TIN—Duty: Plates, Sheets, Tagger and Terne, 15 per cent. ad val.; Electro-galvanized Plates, 2 cents per lb; Manufactures of, not enumerated, 35 per cent. ad val. —all subject to a reduction of 10 per cent. Bars, Banca or Block, and Pigs, free.
Banca....₩ lb 38 c., gold
Straits....₩ lb 33c., gold
English....₩ lb 32c., gold

CHARCOAL TIN PLATE.
I C 10x14, Prime Charcoal....14·00
" 12x12, "....14·50
" 14x20, "....14·75
I X 10x14, "....16·80
" 12x12, "....17·00
" 14x20, "....17·50
For each additional X add....2·60

COKE TIN PLATE.

	Best.	2d Quality.	Ordinary
I C 10x14	$12·50	$12·50	$12·00
I C 12x12	14·00	13·00	
I C 14x20	14·50	13·00	

TERNE PLATE.

	Prime Char.	2d qual.	Coke.
I C 14x20	$12·50	12·00 @ 12·25	9·75 @ 11·50
I X 14x20	14·50		

ZINC.—Duty: Pig or Block, $1 50 per 100 lbs. Sheet, 2½c. ₩ lb. All subject to a reduction of 10 per cent.
Sheet....cask 10½c
"....open 11 c

Paper Stock, Old Metals, &c.

(Dealers' Selling Prices.)

Canvas linen ... 5¾ @ 6
" cotton, No. 1 ... 7¾ @ 7½
" " No. 2 ... 4
White linen rags, No. 1 ... 7 @ 7½
" " No. 2 ... 5 @ 5¼
Colored ... 3 @ 3¼
Mixed woolens ... [illegible]
Soft woolens ... [illegible]
Gunny bagging ... [illegible]
Jute Butts ... [illegible]
Kentucky bagging ... [illegible]
Book stock ... [illegible]
Waste paper and scraps ... [illegible]
Rope cuttings ... [illegible]
Kentucky Bale rope ... [illegible]
Oakum junk, No. 1 ... [illegible]
" No. 2 ... [illegible]
Grass rope ... [illegible]
Tarred Shaking ... [illegible]

Old Metal.

Copper ... 27 @ 28
Yellow metal ... 18 @ 22
Brass ... 18 @ 21
Old lead, solid ... 6¼ @ 6¾
Tea lead ... 5¾
Wrought iron ... 1⅞ @ 2
Sheet iron ... 1 @
Cast iron ... 1¼ @ 1½
Machinery iron ... 1⅞ @ 2
Zinc ... 5¼
Pewter, No. 1 ... 26 @ 27
" No. 2 ... 10 @ 12
Spelter ... 7

Paints, Oils, etc.

Paints.

Black, lamp—Coach Painters ... ₩ lb 20c
" " Ordinary ... 6c
" Ivory Drop, fair ... 15c
" " best ... 26c
Black Paint, in oil ... kegs, 8c.; ass't'd cans, 11 c
Blue, Prussian, fair to best ... 50 @ 75c
" " " " in oil ... 35 @ 65c
" Chinese, dry ... 88c
" Ultamarine ... 25 @ 30c
Brown, Spanish ... 1¼c
" Van Dyke ... 9c
Carmine, 40 ... $12 00
Green, Chrome ... 15 @ 28c
" " in oil ... 18 @ 25c
" Paris ... good, 30c; best, 40c
" " in oil ... " 30c; " 45c
Mineral Paints ... 1¼ @ 4c
Orange Mineral ... 14½c
Red Lead, American ... 9½c
" " English ... 10½c
" Venetian (N. C.) dry ... 2¾c
" " in oil ... ass't'd cans, 11c; kegs, 8½c
" Indian, dry ... 10c
Rose Pink ... 13c
Sienna, American, Raw ... 4c
" Burnt ... 4½c
" " in oil ... 16 @ 26c
" Raw " ... 15 @ 25c
Umber, Burnt ... 4 @ 8c
" " in oil ... 16 @ 21c
" Raw ... 3½ @ 7½c
" " in oil ... 16 @ 22c
Vermillion, Chinese ... $1 40
" English ... 1 86
" Trieste ... 1 16
" American, Common ... 28c
White Lead, American, pure dry ... 11½c
" " " in oil ... 12 c
White, Paris, English, prime ... in bbls. 2½ @ 2¾c
Yellow Ochre, French ... 2½ @ 2¾c
" " " in oil ... ass't'd cans, 11c; kegs, 8½c
" " Vermont ... in casks 1½c
" Chrome ... 17 @ 27c
" " in oil ... 18 @ 28c
Zinc White, American No. 1 dry ... 9c
" 1, in oil ... 11c
" French (Paris) ... 11½c
" " in oil ... 12½c

Oils.

Linseed Raw ... ₩ gal. casks, $1·00; bbls, $1·01
" Boiled ... " $1·05 " 1·06
Whale, Crude ... "
" Bleached Winter ... "
Sperm, Crude ... "
" Winter unbleached ... "
" " Bleached ... " 1·80
Seal, Extra Refined ... " 87½c
Lard, Pure Winter ... " 95c
" Spring ... " 75c
Cotton Seed, Crude ... " 55c
" Southern Yellow ... " 65c
" White ... " 75c
Neatsfoot, Winter ... $1·10 @ $1·35
Natural Lubricating ... bbls, 45c

Sundries.

Asphaltum ... 8c
Benzine ... ₩ gal. 11c
Chalk ... 1¼c
" Block ...
Dryer, Patent, Am'n ... ass't cans, 10½c; kegs, 9c
" " English ... 11c; 9c
Flocks ... 50c
Frostings ... 33 @ 45c
Glue, White ... 35c
" Sheet ... 9c
Glaziers' Points, Zinc ... 36c
Gum, Copal ... 50c
" Damar ... 35c
" Shellac, English ... 32c
" " dark ... 28c
Litharge ... 10c
Pumice Stone, selected Lumps ... 4 @ 6c
" powdered ... 3½c
Putty in bladders ... 5c
" in bulk ... 3c
Rotton Stone, soft, English ... $3 25
Sand Paper, crystal ... 48
" flint ...
Spirits Turpentine ... 50c
Whiting, Spanish ... 1¼c

Glass.

French Window—1st, 2d, 3d, and 4th qualities. Per box of 50 feet.

SINGLE.

SIZES.	I.	II.	III.	IV.
6 x 8 to 10 x 15	$10·75	$9·75	$9·00	$8·25
11 x 14 & 12 x 18	11·50	10·25	9·75	9·00
10 x 16 to 14 x 20	12·50	11·50	10·25	9·00
18 x 22	13·25	12·25	11·25	10·25
15 x 22 to 20 x 30	15·75	14·00	12·00	10·25
22 x 30 to 24 x 30	19·75	16·75	13·00	
24 x 28 to 24 x 36	20·25	17·50	14·00	
26 x 36 to 26 x 44	22·25	20·00	15·50	
28 x 44 to 30 x 50	24·00	21·50	16·75	
30 x 52 to 30 x 54	27·25	24·00	18·75	
30 x 56 to 34 x 56	29·00	25·50	22·00	
34 x 58 to 34 x 60	31·50	27·50	25·50	
36 x 60 to 40 x 60	37·00	32·50	29·50	

DOUBLE.

SIZES.	I.	II.	III.	IV.
6 x 8 to 10 x 15	$16·00	$14·00	$13·50	$12·50
11 x 14 & 12 x 18	17·00	15·50	14·75	13·50
10 x 16 to 14 x 20	18·75	17·25	15·50	13·50
18 x 22	20·00	18·00	16·25	13·50
15 x 26 to 20 x 30	25·00	21·00	19·00	
22 x 30 to 24 x 30	30·00	25·00	22·25	
24 x 28 to 24 x 36	32·00	27·50	22·50	
26 x 36 to 26 x 44	34·00	30·50	25·50	
28 x 44 to 30 x 50	36·00	32·50	28·25	
30 x 52 to 30 x 54	41·00	36·00	29·25	
30 x 56 to 34 x 56	43·00	39·50	33·00	
34 x 58 to 34 x 60	49·00	42·50	37·50	
36 x 60 to 40 x 60	53·00	49·00	45·00	

Sizes above—$12 ₩ box extra for every five inches. Discount to the trade 60 per cent.

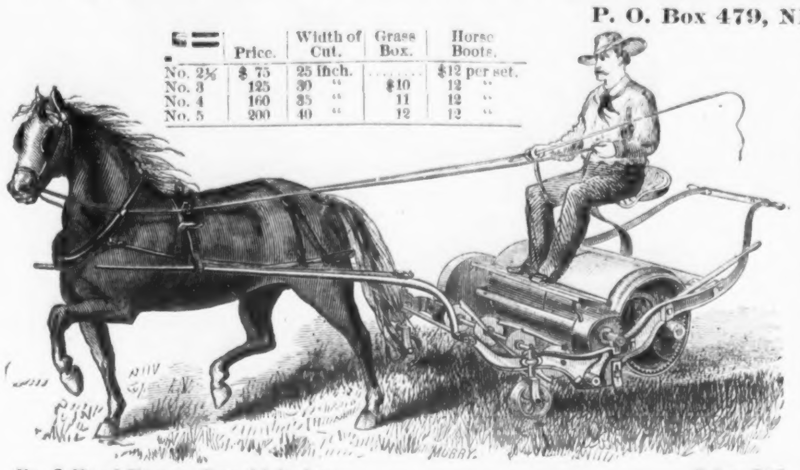
The Improved Excelsior Lawn Mowers,

FOR HAND OR HORSE POWER, MANUFACTURED BY

CHADBORN & COLDWELL MANUFACTURING CO.

P. O. Box 479, NEWBURGH, N. Y.

	Price.	Width of Cut.	Grass Box.	Horse Boots.
No. 2½	$ 75	25 inch.	....	$12 per set.
No. 3	125	30 "	$10	12 "
No. 4	160	35 "	11	12 "
No. 5	200	40 "	12	12 "



No. 0 Hand Mower—Cuts 11 inches........Price, $16.
No. 1 " — " 14 " .... " $25.
No. 2 " — " 18 " .... " $30.

The No. 1 for general use, and warranted. The No. 2 for large lawns—when smooth.

Ask for the Excelsior and get the Best.

For Sale by all the leading Hardware, Agricultural Implement and Seed Stores, in this and foreign countries.

The Excelsior is simple and durable. The *gearing* securely incased and will not clog. Has a *full roller*, without which no machine is perfect. A *ball ratchet*—"noiseless"—needs no oiling. Adjustable *wrought iron handle*. *Hangers* secured by bolts. The front rollers to these are adjustable, to vary the hight of cut. *Open balance wiper*—with *steel knives*—the only practicable means of securing strength and ease of draught. *Patent iron handle*, with attachment on each side of the machine—avoids the serious annoyance of a single wooden handle. The **Excelsior Lawn Mower** having been before the public for four years, and subjected to the most severe tests, the manufacturers feel warranted in asserting that for SUPERIORITY in *simplicity of construction* and *durability* it has no equal. It is *important* in either *Horse* or *Hand Lawn Mowers*, that their design should combine the *greatest strength* with least amount of *metal*; we therefore use only the very *best material*, together with *good workmanship*, enabling us to produce *Lawn Mowers* light *in weight*, of *easy draught*, and at a price within the reach of all.

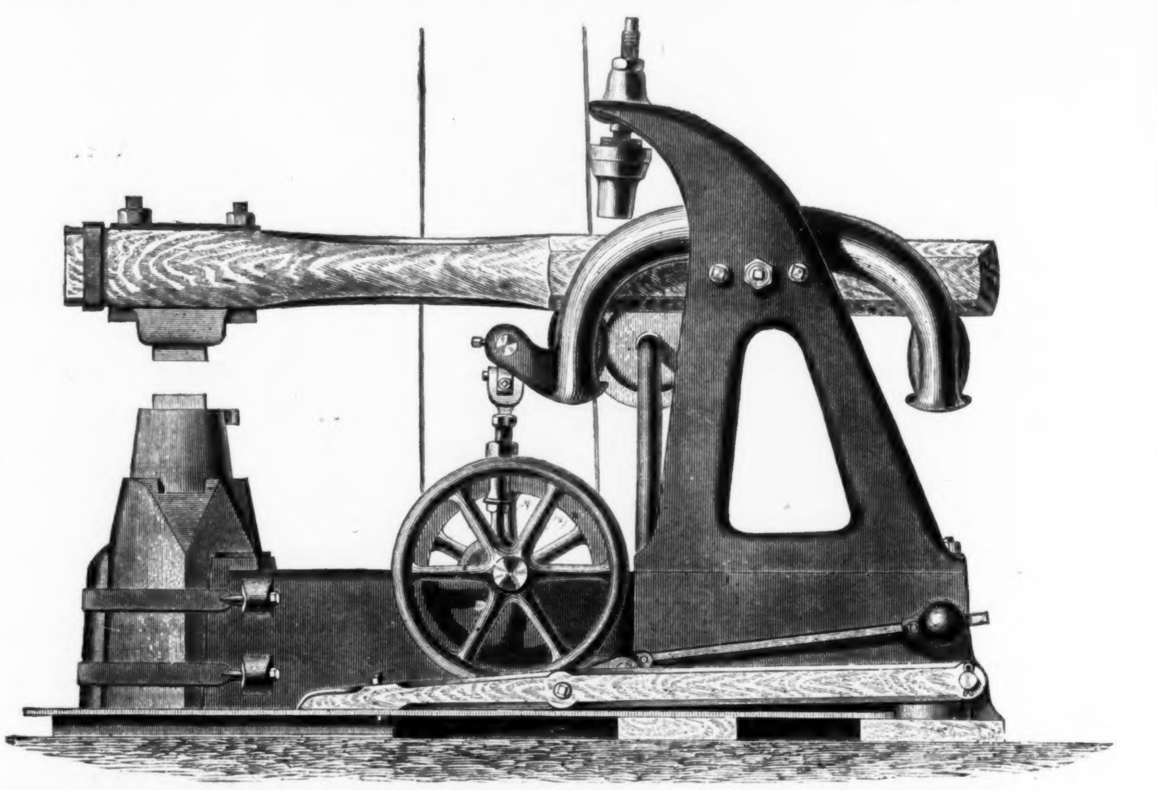
The Excelsior has received the most favorable commendation from all, and the advantages claimed for it over other machines are fully appreciated wherever it is known. To this we add numerous testimonials, but the fact that our sales have greatly increased year by year, is the most convincing proof of its adaptation to the wants of the public.

GRAND SILVER MEDALS AWARDED THE EXCELSIORS AT THE

New England Fair, held at Lowell, Mass., Sept., 1871 and 1872; New Jersey State Fair, held at Waverly, N. J., Sept., 1871 and 1872; the first premium at the New York State Fair, 1871; Western New York Fair, 1871; Ohio State Fair, 1871 and 1872; Northern Ohio Fair, 1871 and 1872; Michigan State Fair, 1871 and 1872; Indiana State Fair, 1871; Wisconsin State Fair, 1871 and 1872; Tennessee State Fair, 1871; Virginia State Fair, 1871; South Carolina State Fair, 1871.

For description of Mowers, and particulars, send for catalogue. Agents wanted. A liberal discount to the trade.

BRADLEY'S CUSHIONED HAMMER.



This Hammer is a great improvement over the old style of helve hammers. It is all made of Iron and Steel except the helve and cushions. It is portable, takes up but little room, and makes no noise except the stroke of the hammer. It takes less power to drive it, and it turns out more and better work. The helve is nicely balanced upon two adjustable hardened steel centers, and there is no bind or friction connected with its action. It will endure more hardships at less expense for repairs, and, consequently, outlasts any other. Its capacity is greatly increased, but not at the expense of its size, convenience or durability It strikes a more accurate, forcible and elastic blow than any other hammer. It is being used and is peculiarly adapted for the exceeding difficult work of swedging cotton spindles; no other hammer has been able to do this work as perfectly and economically. It is the favorite of every hammersman; it promptly obeys his every touch, and he soon regards it as a thing of life. *We warrant them as recommended*, and refer you to the following parties now using them:

W. H. Haskell & Co., Pawtucket, R. I.
Cole Brothers, Pawtucket, R. I.
American File Co., Pawtucket, R. I.
Fales, Jenks & Son, Pawtucket, R. I.
Providence Tool Co., Providence, R. I.
Nicholson File Co., Providence, R. I.
Woonsocket Iron Foundry, Woonsocket, R. I.
John Berkenhead, Mansfield, Mass.
Steele & Condict, Jersey City, N.
Silsby Mfg. Co., Seneca Falls, N. Y
Cowing & Co., Seneca Falls, N. Y.
Rumsey & Co., Seneca Falls, N. Y.
Clapp, Fitch & Co., Auburn, N. Y.
Sweet, Barnes & Co., Syracuse, N. Y.
Warder, Mitchell & Co., Springfield, O.
Robert Doyle, Watseca, Ill.
Furst & Bradley Mfg. Co., Chicago, Ill.
Chicago Plow Co., Chicago, Ill.
Mark H. Richards, Pottstown, Pa.
Peters Bros. Mfg. Co., Marshall, Mich.
Studebaker Bros. Mfg. Co., South Bend, Ind

For particulars address

BRADLEY MFG. CO., Syracuse, N. Y.

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TRADE "VERY HIS OWN PAINTER" MARK.

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It is ready for use.
It is applied with less labor.
It shows a beautiful enamel surface.
It does not chalk or peel off.
It does not run from nail holes or corners.
It is fire proof and water proof.
It covers old work as well as new.
It is the best paint for iron buildings.
It is equal to any for covering brick.
It is a perfect wood preservative.
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It is durable, retaining its enamel and freshness.

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The Atlantic White Lead and Linseed Oil Company,

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FINE TOOLS

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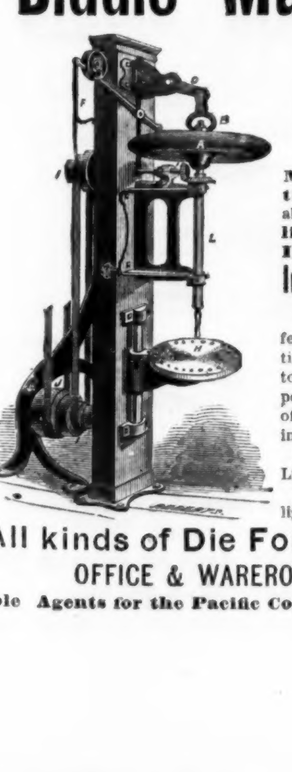

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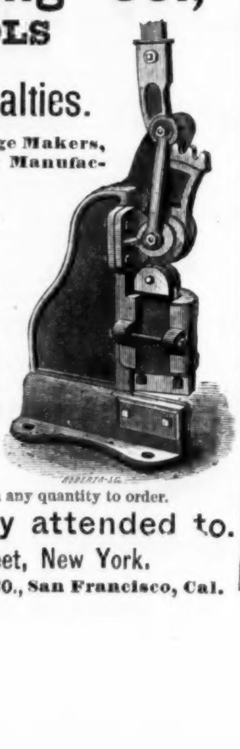

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WEST POINT FOUNDRY,

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Steam Engines, Boilers & Heavy Machinery of all kinds, and Heavy Forgings.

FORD'S PATENT STOVE, for heating Iron for Blast Furnaces.
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NAPIER'S PAT. DIFFERENTIAL CLUTCH, for starting and reversing Heavy Machinery.
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Castings from Gun Metal, guaranteed 30,000 pounds per square inch.

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Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Anvils.—Solid Cast Steel ... ₰ lb 12½c
Peter Wright's ... ₰ lb, gold, 18c
Wilkinson's ... 11½c
Eagle, ₰ lb 11 cents, currency ... dis 15 %
Apple Parers.—Reading and Turn Table..per doz $8 50
Union ... per doz 8 00
Axes.—Mann's Light ... Per doz. $13 00 @ 14 00
Hunt's Light ... " 14 00 @ 14 50
Red Indian, all sizes ... " 12 50 @ 13 00
Red Chieftain, all sizes ... " 13 00 @ 13 50
Crown Prince ... " 13 50 @ 14 00
Augers and Auger Bits.—Pierce's Pat.
Twist Bits ... dis 20 @ 25 %
Bates' & Ives' Bits ... dis 20&10 %
Douglass' Bits ... dis 30 %
Cook's Bits ... dis 25&10 %
Bonney's Pat. Hollow Augers ... dis 25 %
Russell Jennings' Bits ... dis 10 %
Bates' & Ives' Nut Augers ... dis 30&10 %
Douglass' Nut Augers ... dis 30 %
Watrous' Ship Augers ... dis 10 %
Balances.—Landers, Frary & Clark's ... dis 10 @ 15 %
Chatillon's ... dis 10 @ 15 %
Morton's ... dis 10 @ 15 %
Common Spring, with Hook ... ₰ doz $1 25 @ 2 00
Bells.—Bevin Bros. Mfg. Co. Hand Bells ... dis 50 %
" Extra Light Hand Bells ... dis 50&10 %
Other makers, light ... dis 40 @ 60 %
Connell's Door Bells ... old list net
Western and Kentucky ... dis 50 %
Boring Machines.—Bates' Mfg. Co., complete with augers ... dis 10 @ 15 %
Douglas' Mfg. Co., complete with augers..dis 10 @ 15 %
Common Augers ... $4 25 @ 4 00
Angular, Extra Auger ... 5 00 @ 5 00
Bolts.—Eastern Carriage Bolts ... dis 60&20 %
Western " ... dis 60&20 %
Philadelphia " ... dis 40 %
Wrought Shutter Bolts ... dis 45 %
Cast " " ... dis 35 %
Braces.—Barber's ... dis 30&10 @ 40 %
Bartholomew's ... dis 10 @ 15 %
Spofford's ... dis 37½ %
Butts.—Cast Fast Joint, Narrow ... dis 15 %
" Broad ... dis 30 %
Cast Loose Joint ... dis 40 %
" Acorn Drilled ... dis 25&10 %
Wrought Loose Pin ... dis 15&10 %
" Table Hinges and Back Flaps ... dis 10 %
" Narrow ... dis 20 %
" Loose Joint ... dis 20&10 %
Parker's Blind Butts ... dis 25&10 %
Shepard's " ... dis 25&10 %
Clark's " ... dis 25&10 %
Lull & Porter's " ... dis 25&5 %
Palmer's " No. 1 for wood ... dis 40&10 %
" " No. 3 for brick ... dis 25&10 %
Garretson's " ... dis 40&10 %
Extra discount on Blind Butts by the case, 5 per cent.
Chains.—German Halter ... gold list dis 15 %
" Coil ... gold list dis 15 %
Galvanized Pump ... ₰ lb 15c
English Coil, less than cask ... add ½c ₰ lb
Common Chain ... ½c ₰ lb less
Best Proof Coil Chain—
₰ lb ... 11½ 11½ 10½ 10 9¾ 9½ 9c gold
3-16 ¼ 5-16 ⅜ 7-16 ½ ⅝ in.
By the cask, 560 lbs., discount ½c per lb. Common Chain, ½c per lb. less than proof.
Chisels.—Socket Framing ... dis 60 @ 60&5 %
Socket Firmer ... dis 60 @ 60&5 %
Tang ... dis 40 @ 40&5 %
Beaty's Framing and Firmer ... dis 10 @ 10&5 %
Casters.—Porcelain Wheel ... dis 20&10 %
Iron ... dis 20&10 %
Brass ... dis 20&10 %
Clothes Wringers.—Universal ... per doz $72 00
Novelty ... 72 00
Providence ... 72 00
In lots of 2 dozen, discount $2 per dozen.
King Wringers (Iron Frame) ... per doz $68 00
Coffee Mills.—Common Box and Side ... dis 15 %
Patent Box and Side ... dis 10 %
Cutlery.—American Pocket (best) ... dis 20 @ 25 %
Landers, Frary & Clark, J. Russell & Co. and Lamson & Goodnow Mfg. Co. Manufacturers' net prices.
Drawing Knives.—Hart Mfg. Co.'s ... dis 60 @ 60&5 %
Concave Adjustable Handle ... dis 10 %
Beaty ... dis 10 %
Files.—Nicholson Mill Files ... new list, $5 00 to £ cur
Nicholson Bastard ... 5 00 to £ cur
" Taper ... 5 00 to £ cur
Butcher's Mill ... $5 75 to £ gold
" Bastard ... 5 80 to £ gold
" Taper ... 5 50 to £ gold
Moss & Gamble—Mill, Taper and Bastard ... 5 50 @ 5 25 to £ gold
Fluting Machines.
Royal, No. 1, 4½ inch Rollers ... list $6 00
" No. 2, 6 " ... list 7 00
Hammers and Hatchets.
Yerkes & Plumb's ... dis 10 %
Hammond & Son's ... dis 10 %
Hinges.—Strap and T ... dis 25 %
Bonney's No. 1 Gate ... dis 25 %
" No. 2 and 3 ... dis 35 %

Horse Nails.	Nos. 5	6	7	8	9	10
Ausable		27	25	24	23	22
Globe		26	25	24	24	23
Brundage		26	24	23	22	21
Putnam	32	28	26	25	24	23

On Ausable, Globe and Brundage 1000 lb lots ... dis 5 %
Knobs.—Door (regular manufacture) ... dis 40 %
Porcelain and Mineral ... dis 40 %
Locks and Latches.—Rim and Mortise ... dis 40 %
Till and Cupboard ... dis 25 %
American Padlocks ... dis 40 %
Trunk Locks ... dis 5 @ 10 %
Thumb and Roggens Latches ... net @ dis 10 %
Mattocks.—Long and Short Cutter ... dis 15 %
Western Pattern ... dis 15 %
Pennsylvania Pattern ... dis 15 %
Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets ... dis 20 %
Stebbins' Gates ... @ 60&10 %
Lincoln's " ... dis 40 @ 40&10 %
Landers, Frary & Clark's Petroleum ... dis 10 @ 10&10 %
Taylor's Petroleum Faucets ... dis 20&10 %
Rakes.—Cast Steel Garden ... dis 30 %
Malleable Garden ... dis 33⅓ %
Wood Head Iron Teeth ... dis 30 @ 40 %
Rules.—Stanley Rule and Level Co ... dis 60 @ 60&10 %
Steven's and Hubbard's ... dis 60&10 %
Squares.—Steel and Iron, new list ... dis 50 %
Saws.—Disston's Cross Cut ... dis 12½ %
Disston's Hand ... dis 7½ %
W. McNiece's B'd, Cross-Cut & Circ'r, new list..dis 15 %
Boynton's Lightning, new list ... dis 30 %
Shovels and Spades.
Rowland's Plain Back, list Feb. 1873 ... dis 20 %
" Back Strap ... dis 20 %
Oliver Ames & Sons ... net list
Brady Shovel Co ... dis 7½ %
Sad Irons.—Reading (planed face) ... per lb. 5½c.
Coquanock (polished face) ... " 5c.
Stove Polish.—Gem ... ₰ gross, $5·00
Onyx ... " $5·00
Scythes.—Golden Clipper ... ₰ doz. $11·50
Clipper No. 10 ... " 10·50
Common Scythes ... ₰ doz $7·00 @ 10·00
Screws.—Iron ... new list, April 1st, 1873, dis 47½ %
Brass ... dis 50&10 %
Spoons.—Plated Spoons, Rogers Bros.'..dis 25 @ 25&5 %
Britannia, Parker's and Boardman's ... dis 25 @ 25&10 %
German Silver ... list net
" Light ... dis 5 %
Try Squares.—Disston's ... dis 12½ %
Stanley Rule and Level Co ... dis 40&10 %
Willis Thrall, No. 1 ... dis 30&10 %
Willis Thrall, No. 2 ... dis 25&10 %
Tacks, &c.—Half Weight Tacks ... dis 67½ %
" by the case ... dis 67&7½ %
Clout and Finishing Nails ... 7½ %
" " by the case ... dis 7½ %
Traps.—Genuine Oneida—Newhouse list ... dis 20 %
Imitation ... dis 20&10 %
Wrenches.—Coes Genuine ... dis 30 @ 30&10 %
Coes Imitation Wrought Bar ... dis 40 @ 45 %
" Malleable Bar ... dis 45 @ 50 %
" (Kellogg) Malleable Bar ... dis 50&5 %
Tafts Wrought Bar ... 60 %
Tafts Malleable Bar ... 65 %
Wire.—No. 0 to 18 ... dis 25 @ 30 %
No. 19 to 26 ... dis 27½ @ 30 %
No. 27 to 36 ... dis 33⅓ @ 35 %
Coppered 0 to 12 ... dis 15 @ 20 %
Tinned Broom Wire ... dis 15 %

BUFFALO.

Reported by Messrs. Sidney Shepard & Co.
May 9, 1873.

Axes, Chopping—Blood's ... $12 50 @ 14 50
Augers—C. S. Cut ... dis 30 %
Bits, Auger—Pierce's ... dis 25 %
" Jennings' ... dis 10 %
Bells, Cow—Yaw's Genuine ... dis 20 %
Bells, Hand ... dis 60 %
Bellows—Smiths' ... dis 15 @ 20 %
" Moulders' ... dis 10 %
Bolts—Carriage and Tire, Diamond Neck ... dis 60&15 %
Braces, Bit—Barber's ... dis 30&10 %
Spofford's Patent ... dis 37½ %
Brads, Cut ... dis 50&7½ %
Boards—Stove, Brooks' Patent, new list ... dis 30 %
Butts—Brass ... dis 20 %
Cast Loose Joint ... dis 40 %
" " Pin ... dis 30 %
" " Japanned ... dis 30 %
" " Silver Tipped ... dis 20 %
Wrought Narrow ... dis 10&5 %
" Broad, Loose Joint and Loose Pin..dis 15&5 %
" Table and Back Flaps ... dis 5 %
Belting—Rubber ... dis 30 @ 33⅓ %
Leather, new list ... dis 30 @ 30&5 %
Beaters, Egg, "Peerless" ... per doz $4·50
Brick—Bath (box of 2 doz) Best English ... $1·50
" Rutherford " ... $1·25
Bung Borers—"Enterprise" ... dis 10&10 %

Chalk—White, Carpenter's ... ₰ gross, 60c
Red, Carpenter's ... " 80c
Blue, " ... " 90c
Crayon School ... " 14c
Chisels—Firmer Socket ... dis 60 @ 60&10 %
Framing Socket ... dis 60 @ 60&10 %
Corner Socket Chisels ... dis 60 @ 60&10 %
Slick's Carpenters' ... dis 60 @ 60&10 %
Castings—Malleable ... ₰ lb 10½c
Cutters, Meat—Hale's Patent ... dis 10 %
Cherry Seeders ... per doz $9 00

Elbows—Corrugated	5	5½	6	7	
Charcoal	$4·25	5·25	5·25	6·50	dis 10 %
Russia	10·00	13·00	13·00	14·00	

Faucets—Wood, Cork Lined ... dis 50&10 %
Files—Wheeler, Madden & Clemson's ... dis 42½ %
Freezers, Ice Cream—"Champion" ... dis 33⅓ %
Gates—Molasses—
Patent Self-Measuring ... ₰ doz., $43 00; dis 10&10 %
Hinges—Window Blind—
Shephard's Standard, and Clark's ... dis 35 %
Garretson's Blind Hinges ... dis 40 %
Wrought Strap and T ... dis 15&5 %
Hods, Coal—Plain, Black and Galvanized ... new list net
Funnel, Black and Galvanized ... new list net
Fancy and Helmet ... new list net
Hammers—Maydole's ... net
Yerkes & Plumb's ... dis 5 @ 10 %
Hatchets—Blood's ... net @ 5 %
Hooks and Staples—Wrought ... 50&10 %
Hooks—Belt ... dis 45&10 %
Hasps and Staples—Wrought ... dis 50&10 %
Planes, Bench ... dis 15 %
Sad Irons ... ₰ lb 5⅜c
Kettles—Brass ... ₰ lb, 50c
Enameled ... new list dis 40 %
Knives, Drawing—Oval No. 1 ... dis 60 @ 60&10 %
Razor Blade ... dis 37½&20 @ 37½, 20&5 %

Lanterns "Peerless,"	No. 1	5	10	
	₰ doz $26 00	$12 50	$15 00	dis 10 %

"Radiant"	No. 75	100	150	175	
	₰ doz $13 13	$13 13	$22 50	$22 50	dis 20 %

Machines—Apple Paring, Turn Table } " " Lightning } ... $8·50 ₰ doz
Tinmen's ...
Mills, Coffee—Box and Slide, common ... dis 10&5 %
Box Union and Eagle ... dis 10 %
Swift's Patent ... dis 10 %
"Champion" ... dis 10&10 %
Nails—Cut, Chesapeake ... $4 88 rates
Clout and Finishing ... dis 7½ %
Shoe ... dis 7½ %

Horse, Ausable	No. 5	6	7	8	9	10
	30	27	25	24	23	22c

" " 1000 lbs ... dis 5 %

" Clinton	No. 6	7	8	9	10
	23	21	20	19	18c

Packing—Rubber ... dis 30 @ 33⅓ %
Pencils, Slate—Soapstone ... 4 5 6 in. 30 40 50c. ₰ 100
Case lots ... dis 20 %
Paint—White Lead, U. S. Gov't ... ₰ lb 9½c
Rivets—Iron, Black and Tinned ... dis 20 %
Copper ... dis 10 %
Rope—Manila, ½ inch and larger ... ₰ lb 18c
Rules—Boxwood and Ivory, Stephens ... dis 50&10 %
Staples—Blind, Boardman's Pat., ½ & ⅝ ... ₰ lb 37½c
Skates—White's ... dis 20 %
Straps, Skate—Russet and Black ... net @ 20 %
Spoons, Iron Tinned ... dis 10 %
" by the case ... dis 20 %
Plated Rogers' A No. 1 ... dis 25&5 %
Britannia ... dis 25 @ 25&10 %
Squares—Steel and Iron ... new list 50 %
Shoes, Horse—H. Burden & Sons ... ₰ keg $6·50
Shovels & Spades—Shepard, Forsyth & Dennison ... 15 %
Saws—Henry Disston & Sons ... dis 5 %
Scales—Buffalo Scale Works ... dis 25 %
Fairbanks ... dis 15 %
Shears—Seymour's ... dis 50 %
Tools—Tinmen's ...
Traps, Steel—Newhouse ... dis 17½ %
Tacks—Half Weight Am. Iron ... dis 70&7½ %
Vises—Parallel, Buffalo ... dis 15 %
Wrenches—Coes' genuine ... dis 30&35 %
Coes' Imitation ... dis 50&10 %
Tafts' Pattern ... dis 62½&10 %
Ware—French, Tinned and Iron ... dis 20 %
Stamped and Japanned ... net
Cast Iron Hollow ... dis 20 @ 30 %

Tin Plates.—Add for each X ... 2·50

10x14, IC. Charcoal	$14·25	14x20 C. terne	$13·25 @ 13·75
12x12, "	14·75	20x28 C. "	28·50
12½x17, "	18·75	20x28 X. "	33·50
14x20, "	15·25		

Pig Tin—Straits ... 42c @ 43
Banca ... 49c @ 50

Solder	No. 1.	No. 2.	50 lbs. deduct ½c
	24c	22c.	100 " 1c

Sheet Zinc, "Lasalle"	1000	500	100 lb casks
	$11·25	$11·35	$11·55 ₰ 100 lbs

Iron Wire—Bright and Annealed ... dis 25 %
Coppered ... dis 20 %
Tinned ... dis 15 %
Tinned Broom, { Nos. 20 20c, 21 21c, 22 21c } ... dis 20 %
Copper—Sheathing 14 @ 18 oz ... ₰ lb 43c
Planished ... ₰ lb 49 @ 51c
Bottoms ... ₰ lb 42½c
Bolts ... ₰ lb 45c
Braziers' Sheets ... ₰ lb 45c

Sheet Iron—Smooth Finish	Com'n	Char.	Jun.
Nos. 10 to 14	6·85	8·35	10·05c
Nos. 15 to 20	7·35	8·75	10·25c
Nos. 21 to 24	7·55	8·95	10·45c
Nos. 25 & 26	7·75	9·15	10·65c
No. 27	7·95	9·35	10·85c
Am. Russia		A. 15½c	B. 13c

Gen. Russia, No. 1 stained ... 21c
" " clean ... 22c
Galvanized ... dis 20 %

BOSTON.

(*Corrected by Fuller, Dana & Fitz.*)

Tin Plates.—	₰ box	I. C. Coke	@ $13 00
I. C. Charcoal	@ $14 25	" Terne	@ 13 00
Pig Tin.—	₰ lb	Straits, gold	33c
Banca, gold	39c	English "	33c
Copper.—	₰ lb	Braziers	45c
Sheathing	43c	Ingot	37c
" Yellow	33c	Old	
Bolt	45c		
Lead.—	₰ lb	Sheet and Pipe	9·45c
Spanish Pig, gold	6⅜c	Old	6⅜c
Spelter.	₰ lb	American, gold	7c
Silesian, gold	8c		

Zinc.—Sheet ... ₰ lb 11c
Iron.—Sheet Iron, Russia, gold ... ₰ lb 18c
Sheet Iron, English ... " 7c @ 7½c
" " American ... " 8c
" " Galvanized ... " 11c @ 13c

Swedes Bar Iron, Flat, gold ... ₰ ton,	$145 00 @	$155 00
" Shoe Shapes, gold	160 00 @	
Norway Bar Iron, Flats, gold	145 00 @	155 00
" Shapes, gold	160 00 @	
" Round, 2 in. to ⅜ in., gold	150 00 @	
" " 11-16 to ⅜ in. "	167 50 @	
" " 5-16 to ¼ in. "	170 00 @	
" Nail Rods, Rolled "	187 50 @	
" " U. B. "	175 00 @	
" " Benzon "	170 00 @	
" " Vasa "	165 00 @	
" " N I W "	162 50 @	
English Refined Bar Iron	100 00 @	
Scotch Pig Iron	52 00 @	60 00
American "	42 50 @	52 00
Wrought Scrap Iron	50 00 @	52 50

Steel.—	₰ lb	German	11c
Eng. Tool, gold	16c	Spring	9c
" Mach. "	10c	Tire	8c
American Tool	16c	Sleigh Shoe	6⅜c
" Mach	11c	Toe Calk	8⅜c
Bessemer	8½c @ 9½c		

PITTSBURGH.

Card Rates, 60 days.

Flat Bar.—		1¼ & 1⅜ x ⅜ to ⅞ in.	4·4c
1⅛ to 4 x ⅜ to 1 inch	4·2c	1 & 1⅛ x ⅜ to ⅞ in.	4·5c
4¼ to 6 x ⅜ to 1 inch	4·4c	⅝, ¾ & ⅞ x ⅜ to ⅝ in	4·6c
1¼ to 6 x 1⅛ to 1½ in.	4·6c		
Horse Shoes.—		Nail rods	8·1c
All sizes	5·7c		
Heavy Bands.—		⅞ to 1⅛ x ¼ & 5-16 in.	5·2c
3¼ to 6 x ¼ & 5-16 in.	4·8c	⅝ to ¾ x ¼ & 5-16 in.	5·4c
1⅛ to 3¼ x ¼ & 5-16 in.	4·9c		
Light Bands.—			
3 to 6 x 3-16 to No. 12.	5·2c	1 to 1⅜ x 3-16 to No. 12.	5·8c
1¼ to 2¾ x 3-16 to No. 12	5·4c	⅝ to ⅞ x 3-16 to No. 12.	6·4c
Hoops.—2¼ to 3 in.	5·5c	1 in	6·7c
3½ to 4¾ in.	5·7c	⅞ in	7·2c
1¾ to 2 in.	5·8c	¾ in	7·7c
1⅜ to 1 11-16 in.	6·0c	⅝ in	8·2c
1⅛ & 1¼ in.	6·3c	½ in	8·7c
Round and Square.—		⅜ to 7-16	4·9c
1 to 1⅛ in.	4·2c	⅜ in	5·0c
2 to 2⅞ in.	4·5c	5-16 in.	5·4c
3 to 3½ in.	4·7c	¼ in	5·8c
3¾ to 4 in.	5·2c	3-16 in.	7·8c
⅝ to 9-16 in.	4·6c		
Oval Iron.—		⅜ in	5·2c
¾ to 1¼ in.	4·8c	⅝ in	5·8c
⅝ to ⅞ in.	5·0c		
Half Oval and Half Round.—			
¾ to 1¼ in.	5·1c	⅝ in.	6·3c
⅝ to ⅞ in.	5·6c	⅜ in.	7·8c

	Boiled.	Charcoal.	Jun.
Sheet Iron, 10 to 14	5·8	7·3	8·8
" 15 to 20	5·0	7·5	9·0
" 21 to 24	5·2	7·7	9·2
" 25 to 26	5·4	7·9	9·4
" 27	5·6	8·1	9·6

All sheets over 28 in. wide, ½c. ₰ lb extra.

Tank Iron—		Heads flanging	8·9c
3-16, ¼ & ⅜ in. thick	6·0c	Plow Slabs	6·8c
Boiler Plate Iron	7·9c	Plow Wings	7·8c
Heads not flanging	7·1c		
Railroad Iron—Countersunk and Punched.—			
1⅛ x ⅝, 7-16 & ½ in	5·6c	1⅛, 1¾ & 2 x ½ & ⅝ in.	51·c
1½ x ⅜ & 5-16 in.	6·1c	1½ x ⅝ in.	5·3c
Extras for Cutting to Length.—			
Flat bars and rounds and squares	1c	Light bands and wagon box iron	4c
Flat bars for tire	1c	Hoops	5c
Heavy bands	3c		

Steel.

THREE 1st CLASS PRIZE MEDALS. CLASSES 1, 21, 22, Great Exhibition of Industry, LONDON, 1851.

MEDAL OF HONOUR, SOCIETY OF ARTS & INDUSTRY, LONDON, 1856.

1st CLASS PRIZE MEDAL, CLASS 1st UNIVERSAL EXHIBITION OF INDUSTRY PARIS, 1855.

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BEST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;
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BEST CAST STEEL FILES, SAWS, EDGE TOOLS,
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HACKLE AND GILL PINS,
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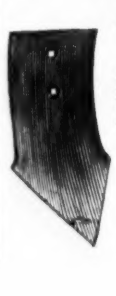

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Ives' extra C. S....dis 20 % | Snell's....dis 10 %
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Axes.—Amoskeag Yankee....₽ doz $14 00
Amoskeag Crescent....14 50
Hunt's Yankee....14 50
Kennebeck Yankee....12 00
Lippincott....14 00
" Crown....14 50
" Beveled....14 50
Jefford's Silver Steel....13 00
Red Warrior, Beveled....14 50
Kennebeck, Handled....16 00
Boy's, Handled....12 00

Bolts.—Carriage and Tire....dis 60&20 %
Cast Barrel and Shutter....dis 20&10 %
Wrought Iron Barrel....add 10 %
" " Square....net list

Butts.—Cast Fast Joint, Narrow....dis 10 %
Cast Fast Joint, Broad....dis 20 %
" Loose Joint....dis 40 %
" Pin, Reversible....dis 35 %
" Japanned....dis 30 %
" Silver Tipped....dis 30 %
Wrought Narrow, Fast Joint....dis 20 %
" Broad "....dis 15 %
" " Loose "....dis 15 %
" Loose Pin....dis 15 %
" Table....net list
" Brass....dis 10 %
Garretson's Blind Butts, Wood....doz sets $2 00
" " Brick....doz sets 3 00
Parker's " Wood....doz sets 2 25
" " Brick....doz sets 3 25

Casters.—Iron Plate....dis 20 %
Brass Wheel Plate....dis 20 %
Porcelain Wheel Plate....dis 20 %
" " Bed....dis 20 %
Iron Wheel Bed....dis 20 %

Chisels.—Butcher's Tanged Firmer....dis 30 %
" Long Paring....dis 30 %
Witherby Socket Framing....dis 50&15 %
" " Firmer....dis 50&15 %
" " Corner....dis 50&15 %
" " Slicks....dis 50&15 %

Coffee Mills.—
Box 4 Iron....$3 75 | Box 85 Cast Steel....$13 00
" 103 "....5 25 | Side 50....4 75
" 102 "....6 25 | " 60....5 75
" 107 Britannia....7 50 | " 70....7 25
" 104 "....8 50 | " 90....18 00
" 25 Union....11 00 | " 15 Union....7 00
" 35 "....13 00 | " 20 "....8 00
" 75 Cast Steel....11 00

Cutlery.—American Table....dis 20 %
" Pocket....dis 25 %

Door Springs.—Torry....₽ doz $7 50
Rubber....4 00
Boon's....5 00

Drawing Knives.—Witherby Tool Co....dis 50&15 %
Ohio Tool Co....net list

Files.—Butcher's....$7 00 £
Nicholson's....$5 00 @ $5 50 £

Hammers.—
Maydole's....net list | Yerks & Plumb....net list
| Cheney....net list

Handles.—
Extra Axe....₽ doz. $3 00 | Coal Pick, No. 1....₽ doz $2 00
No. 1 Axe....2 25 | Sledge, No. 1....2 00
No. 2 Axe....2 00 | Hatchet....65
R.R. Pick, No. 1....2 00 | Hammer, A. E....65

Hatchets.— 1 2 3
Amoskeag Shingling....$7 25 $8 00 $8 75
" Claw....7 25 8 50 9 22
" Lath....7 50 8 25
" Solid Steel....12 00

Hinges.—Strap and T....dis 20 %
Screw Hook and Strap, 8 to 12 in....net, 10c. ₽ lb
" " 14 to 24 in....net, 9c. ₽ lb
Hook and Eye Hinges....net 12c. @ 16c. ₽ lb
Gate, No. 35, State....doz $3 50
" No. 3, In and Out....3 50
" Blinn's Pat....7 50

Horse Nails.—Northwestern, 8d....24c
Ausable, 8d....24c
Globe, 8d....26c

Kettles.—Brass....50c | Enameled....dis 15 %
Locks and Knobs.— | EagleLock Co....dis 15 %
Norwalk Lock Co. dis 35 % | Am. Pad Locks....dis 25 %
Branford " dis 35 % | Cont'al Lock Co....dis 10 %
Meat Cutters.— | Woodruff Patent....net list
Haven's Patent....net list | Stowe's Sausage
Hale's....dis 10 % | Stuffers....net list
Molasses Gates.— | Enterprise Patent...dis 5 %
Stebbin's Patent....dis 40 %

Nails.—10d to 60d....per keg $5 38

Oil Stones.—Washita No. 1....net 35c ₽ lb
Washita Slips....net 65c "
Hindostan No. 1....net 9c "
" Axe....net 10c "
" Slips....net 15c "

Picks and Mattocks.—Picks, Railroad....₽ doz $13 50
Axe Finish....10 00
Picks, Coal, Axe Finish....16 50
Mattocks, L. C., Axe Finish....16 00
" S. C....12 00
Grub Hoes, Axe Finish, No. 2....

Planes.—Ohio Tool Co., Bench....dis 15 %
Sciota....dis 20 %
A. Howland & Co., Bench....dis 15 %
" " Fancy....dis 15 %
Bailey Patent Iron....dis 15 %
Plane Irons, Butcher's....dis 30 %

Rivets.—Iron dis 10 @ 15 % | Copper, No. 7 net, ₽ lb, 60c
Tinned....dis 10 %

Rules.—Stanley Rule and Level Co....dis 50&10 %
Hubbard & Curtiss Mfg. Co....dis 50&10 %

Sad Irons.—Best A No. 1....₽ lb, 5 @ 5¼c
" Copper Face Star....₽ lb, 5¼c

Sandpaper.—
Wiggin & Stevens, No. 0 to 1½....₽ ream, net, $4 50
" " No. 2 to 3....5 00

Sash Locks.—Champion....₽ gross, net, $12 00
Hopkins & Dickinson....dis 10 %
Judd's Patent....dis 10 %
Corbin's Patent....dis 10 %
Clark's Patent....dis 20 %

Saws.—H. Disston & Sons....dis 5 %
Champion X Cut....₽ foot, net, 65c
M. A. & Co. X Cut....55c
Lightning Cut....70c

Screws.—American Screw Co.—Iron....dis 45 %
American Screw Co.—Brass....dis 50 %
" —Blued Rd. Head....dis 25 %

Shovels and Spades.—
Ames' Black Shovels....₽ doz $14 50
" Polished "....15 50
" Patent "....18 00
Alling "....17 50
" Molders'....18 00
Crane's Black "....12 00
" Polished "....13 00
Smith's " B. S. L. H. Hd. Ft....13 50
" " B. S. D. H. Hd. Ft....14 00
Ames' Black Spades....16 00
" Polished "....17 00
" Patent "....17 50
Alling "....15 50
Crane's Black "....12 50
" Polish'd "....13 50

Scoops.—Alling Steel Polished, No. 2....₽ doz, $14 00
Alling Steeled Polished, No. 3....14 50
" No. 4....15 00
" No. 5....16 00
" No. 6....17 00
" No. 7....18 00
" No. 8....19 00
" No. 10....22 00
Crane's Polished, No. 5....14 00
" No. 6....15 00
" No. 7....16 00
" No. 8....17 00
Crane's Black Coal, No. 4....18 00
" No. 5....18 50
Preston, Black Scoops No. 1....12 00
" No. 2....12 50
" No. 3....13 00
Half Pol. Scoops No. 1....13 00
" No. 2....13 50
" No. 3....14 00
Lippincott, Half Pol. No. 2....16 00
" " No. 3....17 00

Wrenches.—Taft's....dis 60 %
Coe's Imitation....dis 45 %
Coe's Genuine....dis 25 %

Wringers.—Novelty Clothes Wringer....₽ doz $72 00
Universal Clothes Wringer....72 00
Mead's "....55 00

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Tin Plate.—
IC, 20x14, Coke....$13 50 | IX, 14x20, Charcoal....18 50
IC, 10x14, Charcoal. 14 50 | IXX, 14x20, "....21 50
IX, 10x14, "....17 50 | IXXX, 14x20, "....24 50
IC, 12x12, ".... | IXXXX, 14x20, "....27 50
IC, 12x12, "....15 00 | IX, 14x14, "....29 00
IX, 12x12, "....18 00 | DC, 100 Plate, "....14 50
IC, 14x20, ".... | DX, "....17 50
IC, 14x20, "....15 50 | DXX, "....20 50
| DXXX, "....23 50
IC, 14x20, Coke Roofing....
IC, 14x20, Charcoal Roofing....14 00
IX, 14x20, "....17 00
IC, 20x28, "....29 00
IX, 20x28, "....34 00

Pig Tin.— | Small, 30 lb....43c
Large, 60 lb....42c | Bar Tin....44c

Zinc.—
In casks 1000 lbs....11 c | In sheets....11½c
" 500 "....11¼c | Slab....9c

Copper.—Copper Bottoms....45c
Sheathing Copper....43c
Planished Copper, 14x48....51c
Size, 14x52, 14x56, 14x60 / Nos. 7 8 9 } Planished Copper....53c

Braziers' Sheets, 30x60.—6 to 8 lbs....51c | 15 to 100 lbs....45c
10 and 12 lbs....48c | Ingot Copper....
| Bolt "....50c

Solder.—Extra Fine, C. B. & Co.'s Brand....27c | Ordinary, No. 2....23c
Fine, No. 1....25c | Plumbers' Solder....23c
| Braz'rs' or Spelt'r Solder 45c

Babbit Metal....15c. @ 25c.
Galvanized Iron Conductor Pipe....₽ lb 10c

Sheet Iron.— Common. Smooth. Charcoal.
No. 14 to 24....6¾c 7¾c 8¾c
" 25 & 26....6¾c 7½c 9 c
" 27....7 c 7¾c 9¼c
Add ¼c ₽ lb for 30 in. wide.

Galvanized Iron....dis 20 %
No. 16 to 20....15c | No. 27....18c
" 21 to 24....16c | " 28....20c
" 25 & 26....17c

Russia Iron.— | Perfect, 11, 12 and 13....20c
Perfect, 9 and 10....22c | In Sheets, 1c. higher.

Lead.— | Lead Pipe, in full coils 10½c
Pig....8½c | Lead Pipe, when cut.. 11c
Bar....10c | Sheet Lead....10½c

ST. LOUIS.

Corrected weekly by Semple, Birge & Co.

Anvils.—Armitage....₽ lb, gold, 13c
Peter Wright's....14½c
Wilkinson's....12½c

Apple Parers.—Conqueror....₽ doz, $9 00
Lightning....9 00
Turn Table....9 00

Augers and Bits.—Cook's....dis 25 %
Ives'....dis 20 %
Jennings'....dis 5 %
Snell's....dis 12½ %

Axes.—Hunt's....₽ doz $14 50 @ 15 50
Lippincott's....14 00 @ 15 00
Lippincott's Pioneer....14 50 @ 15 50
Simmons'....13 50 @ 14 50

Axles.—Kritch & Crane Mfg. Co.'s—
Patent Taper Axles....dis 10 %
Swelled Taper Axles....dis 10 %
Concord Axles....dis 10 %
Red Jacket Axles....dis 10 %
Common Axles, 1½ inch and upward....₽ lb, 8¾c
" " less than 1½ inch....9¼c

Bells.—Troy, Church....₽ lb, 50c
Light Brass, Hand....dis 50 %
Moore's, Cow....dis 10 %

Bolts.—Arms, Bell & Co.'s Machine....dis 10 %
Arms, Bell & Co.'s Carriage and Tire....dis 60&15 %
Norway Iron Carriage and Tire....dis 45&5 %
Cast Iron Barrel, Shutter, &c....dis 25 %

Cast Butt Hinges.—Narrow Fast Joint....dis 15 %
Broad Fast Joint....dis 30 %
" Loose "....dis 40 %
Reversible....dis 40 %
" Japanned and Silver Tipped....dis 40 %
Loose Joint "Acorn"....dis 35 %
" " Japanned....dis 25 %
Excelsior Reversible Blind....dis 30&10 %
Lull & Porter's Blind....dis 35 %

Wrought Butts.—Narrow....dis 10 %
Reversible....dis 15 %
Broad....dis 15 %
Table Hinges....net list
Back Flaps....net list
Inside Blind Hinges....net list

Casters.—Porcel'n Wheel Bed or Plate..rev. list dis 15 %
Iron or Brass Wheel Bed or Plate....

Chain.—Eng. Coil, 3-16 ¼ 5-16 ⅜ 7-16 ½ in.
15 12½ 11¼ 11 10½ 10c gold
Trace....6½-10 3 75c "
"....2 80c "
German Coil and Halter....new list add 25 % "
American Coil—Short Link.
Size, inches....⅜ 7-16 ½ 9-16 ⅝
Price cents ₽ lb....12½ 12½ 10½ 10 9½ net
Size, inches....11-16 ¾ 13-16 ⅞ 15-16
Price, cents ₽ lb....9½ 8¾ 8¾ 8¾ 8¾ net
Size, inches....1 1 1-16 1⅛ 1 3-16 1¼
Price, cents ₽ lb....8¾ 8¾ 8 7¾ 7¾ net
All larger sizes same price as 1¼ in. Stud chain 1c less than same size close link.

Chisels.—Socket, Firmer or Framing....dis 55 %

Clothes Wringers.—Colby's....₽ doz $66 00
Novelty....72 00
Universal....72 00
Monitor....72 00

Coffee Mills.—Parker's....net list
P. S. W. & Co.'s....dis 5 %

Corn Knives.—Dunn E'ge T'ol Co.'s Clip..₽ doz $5 75
Disston's....5 75

Crow Bars.—Steel Pointed....₽ lb 8 @ 10c
Solid Cast Steel....20c

Cutlery.—J. Russell & Co.'s } new list, dis 15 %
Lamson, Goodnow & Co.'s
Landers, Frary & Clark's

Files and Rasps.—
Nicholson's Mill Files....$5 50 to the £, currency
Nicholson's Other Files....5 00 to the £, currency
Butcher's Files....7 00 to the £, currency
Heller's Horse Rasps..$10 00 to the £, currency, dis 40 %

Forks and Hoes.—
Auburn Mfg. Co.'s Hay and Manure Forks....dis 25 %
" " Handled Hoes....dis 20 %
" " Planter Eye Hoes....add 20 %
Winsted's Planter Eye Hoes....add 20 %

Hammers.—Yerkes & Plumb....new list net
Masons' Hammers....₽ lb 20c
Smith Hand Hammers....22c

Handles.—Axe....Extra. No. 1. No. 2. No. 3.
$2·25 $2·25 $1·75 $1·00
Pick....Extra. No. 1. No. 1½. No. 2.
$2·50 $2·00 $1·75 $1·25
Smith & Montross Fork, Hoe and Rake....dis 10 %
" " Broom and Mop....$12 @ $18 ₽ M.

Harrow Teeth.—1 inch iron....₽ lb 6c
" ⅞ inch iron....6c
" ¾ inch iron....6¼c
Barbed or Headed....½c extra

Hatchets.—Hunt's....add 5 %
Simmons'....dis 5 %

Hay Knives.—Lightning....₽ doz $24 00
Dunn Edge Tool Co.'s....—dis 10 %
Fisher's....—dis 10 %

Hinges.—Strap and T—St. Louis make....dis 10 %

Horse Nails.—Eureka....23c rates
Ausable....22c "
Northwestern....22c "
Eagle....19c "
National Patent Pointed....21c "
" Extra Finished....22c "

Horse Shoes.—R. I. (Perkin's pat.)....₽ keg $7 00
Burden's....7 00
Mule Shoes....1 00 extra
Rhode Island Trotting Shoes....2 50 "

Locks and Latches.—Jones & Nimick's....dis 33⅓ %
Moorhead, Adams & Co....dis 33⅓ %
Norwalk Lock Co.'s revised list....dis 33⅓ %

Mattocks and Grub Hoes.—
Klein, Logan & Co.'s Mattocks....₽ doz. $15 00 @ 16 00
" " Grub Hoes, Oval Eye....12 00 @ 13 00

Nails.—Wheeling....$5 25 rates.
Orders for 100 kegs 12½c ₽ keg less.

Picks.—Klein, Logan & Co.'s R. R. and Clay ₽ doz.$12 00
" " Coal....9 75
" " Poll....12 00
" " Stone....16 50
" " Tamping....19 00

Planes.—Ohio Tool Co.'s....net list
Eastern....dis 5 %

Post Hole Augers.—Clark's Patent—
No. 1, ₽ doz. $27; No. 2, $30; No. 3, $33....dis 20 %
Barton's Patent....₽ doz. $25—dis 20 %
Vaughn's....25—dis 10 %

Sad Irons.—Monitor Brand, Silver Polished....₽ lb 6c

Sash Weights.—Standard Solid Eyes....₽ lb 3½c

Saws.—Disston's....dis 5 %
Spear & Jackson's....$5 00 to £ gold
Hubbard, Lippincott, B. & Co.'s....dis 10 %
Branch, Crooks & Co.'s....dis 10 %
Livingston's Patent Buck....net list

Screws.—American Screw Co.'s revised list....dis 42½ %
$2000 worth in 6 months....2½ % extra

Scythes.—Blood's C. S. & G. S....net list
Dunn Edge Tool Co.'s, Factory List....dis 15 %
Waldron's English....dis 20 %
"....$10 00 to £

Scythe Stones.—No. 1 Ind'n Pond ₽ gr's $7 50
Extra Indian Pond....7 50
Premium....11 00
No. 2....7 00
Diamond Grit....13 00 } dis 25 %

Shovels, Spades and Scoops.—Ames'..add $1 to list
Lippincott's....new list net
Rowland's, Maxwell....revised list net

Sledges.—Smith's Stone or Coal Sledges—
Steel Face Polished....₽ lb, 17c
Solid Cast Steel....35c
Striking Sledges....₽ lb extra, 1c

Snaths and Cradles....dis 20 %

Springs.—Cleveland Spring Co.'s—
Carriage and Express....dis 5 %
Blue Seat Springs....new list dis 10 %

Tacks.—Norway Tack Co.'s ⅛ weight....dis 67½ %
Brads....dis 50 %

Traps.—Newhouse Patent....dis 12½ %
Reichard's Animal, Wood Bottom....₽ doz $10 00
" " Metal Bottom....12 00

Vises.—Solid Box....₽ lb 18c
Wilson Mfg. Co.'s....dis 15 %

Wrenches.—Coes' Genuine....dis 25 %
Coes' Pattern....dis 40 %
Taft's....dis 50 %

St. Louis Metal Market.

(Corrected Weekly by Messrs. R. Sellew & Co.)

Tin Plate.—
IC, 10x14, Charcoal....$14 50 | IX, 20x28, Terne....$34 00
IX, 10x14....17 50 | IC, continuous....
IC, 12x12....15 00 | " 20 in. x 200 ft....27 00
IX, 12x12....18 00 | IX, continuous....
IC, 14x20....15 50 | "....34 00
IX, 14x20....18 50 | IC, 10x14, best Coke....13 50
IC, 14x20, Terne....14 00 | IC, 10x14, good "....13 00
IX, 14x20, "....17 00 | IX, 10x14, "....21 00
IC, 20x28....29 00 | IC, 14x20....13 50

Block Tin.—
Large Pigs....43c | Bars....44c
Small "....

Sheet Zinc.—
Casks....₽ lb 11c | Sheet....11½c

Solder.—
No. 1, Refined, in bars or plate....25c
No. 2....23c
Pig Lead....8½c

Sheet Copper.—18 to 100 lbs. Sheets 30x60....45c
14 to 16 lbs....47c
10 to 12 lbs....47c
6 to 9 lbs....50c
Tinned, 14 and 16 oz. 14x48....48c
Planished, 14 and 16 oz. 14x48....51c
" No. 7, 8 and 9....53c
Copper Bottoms....45c

PITTSBURGH.

The following are the card rates of Lewis, Oliver & Phillips:

Iron, standard list, assorted sizes, for large orders, 4·2c, card rate, 2 % off net.
Iron Wedges....6 c ₽ lb net
Norway Nail Rods....9½c ₽ lb net
Fence Pickets—⅜ round, bent to shape.30c ₽ ft. of fence
Discount off Standard List.
Carriage and Tire Bolts....60&10 % off net
Plow Bolts....20 % off net
Stove Bolts....at the list price
Machine and Square Head Bolts....20 % off net
Coach and Lag Screws....20 % off net
Bolt Ends....20 % off net
Pat. Hot Pressed Square and Hexagon Nuts.4c ₽ lb off net
Washers, all made from new band iron....4c ₽ lb off net
Nuts and Washers in 25 lb. boxes, 1c ₽ lb ex. Nuts and Washers in lots less than one keg each size, 1c ₽ lb ex.
Harrow Teeth, in lots of 1 ton or more, packed in cases, 1 in. diam. 5¼c ₽ lb net; ⅞, ¾ in. diam. 5¼c ₽ lb net; ⅝ in. diam. 5½c ₽ lb net.
Patent Headed Harrow Teeth, packed in casks.½c ₽ lb ex
Skein Bolts, in bulk, in lots of 1 keg or more, ⅝ in. diam. 8½c ₽ lb net; 9-16 in. diam. 9½c ₽ lb; ½ in. diam. 10½c ₽ lb. 1c ₽ lb extra when less than 1 keg of each size is ordered.
Screw Hook-and-Eye Hinges, ¾ to 1 in. diam. 10½c ₽ lb net; ⅝ in. diam. 11½c ₽ lb net; ½ in. diam. 13½c ₽ lb net.
Screw and Strap Hinges, in lots of 50 pairs or more, 14 to 36 in. long, 7½c ₽ lb net; 8, 10 & 12 in. long, 9c ₽ lb net.
Strap and T Hinges....15 % off net, delivered
If purchases of Strap and T Hinges between Jan. 1st and July 1st amount to $1000 or over, 5 % dis. allowed.
Screw Hitching Rings....$7 00 ₽ 100 net
Duck Nest Tuyere Irons....$16 50 ₽ doz net
Cast Iron Washers....₽ lb 5 c net
Bridge and Roof Bolts—
1 to 2 in. diam. over 8 ft. long....₽ lb 5½c net
1 to 2 in. diam. from 4 to 8 ft. long....." 6 c net
1 to 2 in. diam. from 1½ to 4 ft. long....." 6½c net
⅝, ¾ and ⅞ in. diam. over 4 ft. long....." 6½c net
⅝, ¾ and ⅞ in. diam. from 1½ to 4 ft. long " 7½c net

WAGON HARDWARE.

Wagon Box Strap Bolts—
10 in. long by 7-16 at Screw End, ₽ set of 8 bolts..55c
12 " ½ " " 8 " ..70c
10 " 9-16 " " 8 " .. } 90c
12 " 9-16 " " 8 " .. }
14 " 9-16 " " 8 " ..$1 00
10 " ⅝ " " 8 " .. } 1 00
12 " ⅝ " " 8 " .. }
14 " ⅝ " " 8 " ..1 10
16 " ⅝ " " 8 " ..1 20
5c ₽ set for each additional inch over 14 in. All lengths made.
Wagon Box Rods, narrow track, each....18c
" " wide track, each....20c
Single Tree Irons, ₽ set of four pieces....38c
Wrought Iron Bolster Plates, 2¾ in. wide, ₽ set....60c
" " 3 " "....65c
" " 3¼ " "....70c
" " 3½ " "....75c
Wagon Brake Ratchets, each....16½c
" " " finished with guard, each..45 c
Wrought Hammer Straps, heavy pattern, each....16 c
" " " light " each....13½c
" Rub Irons, each....11 c
Stay Chain Hooks, each....8 c
Double and Single Tree Clips, figure 1, each....9 c
" " " " 2, each....10 c
" " " " 3, each....12 c
Strap Bolts, Rods, Single Tree Irons, Bolster Plates, Brake Ratchets, Hammer Straps, Rub Irons, Stay Chain Hooks and Clips, in lots of 50 set....dis 20 %
Wagon Box Staples, 1⅛ to 2⅛ in. to clinch. ₽ 1000 $14 00 net
" " Box Iron, to rivet on. ₽ 1000 9 50 net
Neck Yoke Eyes, each....5¾c net
" " with ⅜ rings, each....8½c net
King Bolts, ⅞, 1, 1⅛, and 1¼ in. diam....₽ lb 5½c net
Wagon Rivets, ex. large, oval and steeple head, ¼ in. diam. all lengths....." 10½c net
Wagon Rivets, 3-16 in. diam., all lengths....." 12½c net
" & Nails, in 5 lb paper boxes....₽ lb 1c extra
" " in 25 lb wood "....." ½c extra
Wagon and Hinge Nails, ¼ in....₽ lb 17 c net
" " " 3-16 in....." 19 c net
Double Tree Plates....}
Coupling "....} " 9½c net
Tongue "....}
Neck Yoke Plates....." 12 c net
Tongue Cap Iron, 1¾, 2 & 2¼ in. wide, same price ₽ lb as Band Iron.
Wagon Chains, Stay Lock and Tongue, 3-16 in, ₽ lb 12c net; ¼ in., 14c net.

DETROIT.

(Reported by Messrs. Jewett & Root.)

Tin Plate.—Best Charcoal | **Copper.**—
IC, 10x14....$14 00 | Sheathing....43c
IX, 10x14....16 75 | Copper Bottoms....42c
XX, 10x14....19 50 | **Planished Copper.**—
IC, 12x12....14 50 | Sheathing, 14x48....50c
IX, 12x12....17 25 | Boiler Size, No. 7....52c
IC, 14x20....15 00 | " " No. 8....52c
IX, 14x20....17 75 | " " No. 9....52c
XX, 14x20....20 50 | **Pig Tin.**—
XXX, 14x20....23 25 | Large Pigs....40c
XXXX, 14x20....26 00 | Small Pigs....41c
DC, 100 Plate....13 50 | Bars....42c
DX, "....16 25 | **Solder.**—No. 1....22 c
DXX, "....19 00 | No. 2....21½c
DXXX "....21 75 | **Bright Wire.**....dis 20 %
DXXXX 100 Plate....24 50 | **Sheet Iron.**—
IX, 14x14....25 50 | No. 18 Am. Com....6½c
IC 10x14 W....13 50 | No. 24 Am. Com....6½c
IX, 10x14 W....16 25 | Pat. Am. Russia "A,"
Roofing Tin.—Best Char. | Nos. 24, 25 & 26....14½c
IC, Terne, 14x20....$12 75 | Russia No. 9, 10, 11&12.22 c
IX, " 14x20....15 50 | W. D. WOOD'S & CO.'S SHEET
IC, Terne, 20x28....27 00 | IRON.—
IX, " 20x28....31 00 | Nos. 15 to 20 Smooth $7 25
Coke Tin.— | " 21 to 24....7 45
IC, 10x14 Coke....$13 00 | " 25 & 26....7 65
IX, 10x14, Coke....15 75 | " 21 to 24 Char'l..8 95
IC, 14x20, "....14 00 | " 25 & 26 "..9 15
Sheet Zinc.—Any width....11c

CINCINNATI.

Reported by Sellew & Co., Importers and Jobbers of Metals, No. 214, 216 and 218 Main street.

Tin Plate.—I. C. 10x14 Charcoal....$15·50 @ $16·50
I. C. 10x14 best Coke....14·50 @ 15·50
I. C. Terne, 14-20....14·00 @ 15·50
I. C. " 20-28....30·00 @ 31·50
I. C. Continuous....28·00

Pig Tin.— | Straits....lb ₽ 42c
Banca....₽ lb 47c | English....42c @ 43c
Solder.— | A 1....₽ lb 25c
S. & Co....₽ lb 28c | Roofing....." 24c
Lead.—Pig..₽ lb 7¾c @ 8c. | Bar....₽ lb 8½c @ 9c
Copper.—
Ingot....₽ lb 34c @ 36c | Brazier, 6 to 9 lb...₽ lb 51c
Planished..." 51c @ 54c | " 10 to 14 lb..." 48c
Sheathing.." 45c @ 48c | " 14 to 100 lb.." 45c
Bolt....." 45c @ 48c | Copper Bottoms..." 45c
Zinc.—Cask, 500 to 1000 lbs....₽ lb 11¼c @ 11½c
Case, 100 lbs....." 12c
Slab....." 8½c @ 9½c
Brass.— | Roll, No. 38 to 40...₽ lb 50c
Roll, No. 6 to 30. ₽ lb 45c | Wire, No. 0 to 20...₽ lb 50c
" 30 to 38. " 65c | " 20 to 25..." 60c
Babbit Metal.— | Black Lead....₽ lb 25c
Sellew & Co....₽ lb 35c | Market....." 15c
Antimony....₽ lb 22c
Bismuth....₽ lb $6 00
Nickel....₽ lb $3 50
Pig Iron.—

HOT BLAST CHARCOAL PIG.

Hanging Rock, No. 1....$55 00 @ $
" " No. 2....52 00 @ 53 00
" " Forge....45 00 @ 46 00
Tennessee, No. 1....54 00 @ 55 00
" Forge....44 00 @ 45 00
Alabama, No. 1....55 00 @
Missouri, No. 1....55 00 @
" No. 2....53 00 @ 51 00

HOT BLAST STONE COAL PIG.

Missouri, No. 1....$55 00 @ $
" Forge....43 00 @ 44 00
Ohio, No. 1....53 00 @ 54 00
" Forge....43 00 @ 44 00
Scotch Pig, No. 1....

COAL BLAST CHARCOAL.

Hanging Rock, Car Wheel....$62 00 @ $67 00
Missouri, Car Wheel....60 00 @ 62 00
Red River, "....60 00 @
Tennessee, "....60 00 @ 62 00
Alabama, "....60 00 @ 62 00
Blooms....115 00 @ 120 00

Sheet Iron.— | Am Russia A..₽ lb 15 @ 16c
Russia....₽ lb 22c @ 23c | " " B.. " 14 @ 15c

	Com. B.	Smooth Fin. S. L. U.	Smooth D. Re'fd.
18 to 20	6·0c	7·5c	9·0c
22 to 24	6·2c	8·0c	9·2c
26	6·4c	8·0c	9·4c
27	6·6c	8·2c	9·6c

Galvanized Iron.—Full bundles....dis 20 %
Nos. 18 to 20....15c | No. 27....18c
22 to 24....16c | 28....20c
25 to 26....17c

Bar Steel.—Silver, ₽ lb 21c; Crescent, 17½c.
Iron Wire....dis 15 @ 20 c
Enameled Ware....dis 25 @ 33 c
One Piece Corrugated Elbows.—

Charcoal Iron.		Russia Iron.	
4½ inch....₽ doz	$3·75	4½ inch....₽ doz	$8·00
5 "	4·25	5 "	10·00
5½ "	5·25	5½ "	13·00
6 "	5·25	6 "	13·00
7 "	6·50	7 "	14·00

Leader Elbows—Flat Crimp Retinned.—

	₽ doz.		₽ doz.
2-inch	$2 00	2½-inch	$2 25
3-inch	2 50	3½-inch	3 00
4-inch	3 50	4½-inch	4 00

Sheet Iron Bread Pans....₽ lb 12½c
American Broilers....₽ doz, $13·50
Tinmen's Machines....net list
Sad Irons....₽ lb, 5½c
Brass Kettles.—Ansonia....50c
Wrought Iron Pipe....dis 55 %

Inside Diameter, inches.	⅛	¼	⅜	½	¾	1	1¼
Price, ₽ foot	·10	·10	·12	·15	·20	·29	·39
Weights of Pipe, ₽ foot.	·24	·42	·56	·85	1·12	1·67	2·25
Inside Diameter, inches.	1½	2	2½	3	3½	4	
Price, ₽ foot	·50	·70	1·10	1·50	1·85	2·30	
Weights of Pipe, ₽ foot.	2·69	3·66	5·77	7·54	9·05	10·72	

TUBAL SMELTING WORKS,

760 South Broad Street, PHILADELPHIA.

DUPLAINE & REEVES,

MANUFACTURERS OF

ANTI-FRICTION METALS

OF VARIOUS GRADES.

XXX Metal Nickel Hardening	55 cts. ℔ ℔	D	These metals are alloys of lead, with a large percentage of tin, antimony and copper, according to price.	25 cts.
XX Metal Nickel Hardening	50 cts. ℔ ℔	E		20 cts.
X Metal Copper Hardening	45 cts. ℔ ℔	F		18 cts.
" " "	40 cts. ℔ ℔	G	These metals are the ordinary low priced Babbitt alloys, used where there is not much wear on the machinery, and where economy is required.	16 cts.
B " " "	35 cts. ℔ ℔	H		14 cts.
C " " "	30 cts. ℔ ℔	I		1[illegible] cts.
		J		12 cts.

BRASS CASTINGS

Of all qualities of metals, 22 to 45 cts. ℔ ℔. Pig Brass, 23, 25, 28, 31, 36, cts ℔ ℔. Importers of Block Tin, Lead, Antimony, Spelter, Crucibles, etc.

J. E. HALSEY, Agent for New York,

P. O. Box 4140. 76 Reade St., N. Y.

Plumb, Burdict & Barnard,

BUFFALO, N. Y.

MANUFACTURERS OF

BOLTS

COACH SCREWS,

SKEIN BOLTS,

PATENT

Diamond Neck Carriage Bolts,

TIRE, SLEIGH SHOE,

Machine and Blank Bolts.

FERNALD & SISE, N. Y. Agents, 100 Chambers St.

AUSABLE HORSE NAIL CO.,

MANUFACTURERS OF

SUPERIOR HAMMERED HORSE NAILS.

FROM

BEST NORWAY IRON.

ORDERS PROMPTLY FILLED AT LOWEST MARKET RATES.

ABRAHAM BUSSING, Secretary,

35 Chambers Street, NEW YORK

N. B.—Beware of imitations. No machines the same as ours are in operation in the United States east the Alleghany mountains

---

GLOBE NAIL COMPANY,

MANUFACTURERS OF

Pointed Polished & Finished Horse Shoe Nails.

Recommended by over 20,000 Horse Shoers.

All Nails made from best NORWAY IRON, and warranted perfect and ready for driving. Orders filled promptly and at lowest rates by

GLOBE NAIL CO., Boston, Mass.

Semple, Birge and Co.

HARDWARE SPECIALITIES AND AGRICULTURAL TOOLS

ST. LOUIS, MO.

CORDAGE, ROPE, etc.

D. ALLEN'S SONS, Manufacturers,

136 Front Street, New York.

Manila and Sisal Cordage,

JUTE ROPE.

Send for Price List.

OILERS! OILERS!

J. H. WHITE, Newark, N. J.,

MANUFACTURER OF

Olmsted Patent and Common Oilers,

of all descriptions,

Colwell Patent Door Spring Children's Carriage Trimmings, Spun and Stamped Brass for all Trades, Dies and Tools, &c., &c.

Wm. & Harvey Rowland,

Manufacturers of

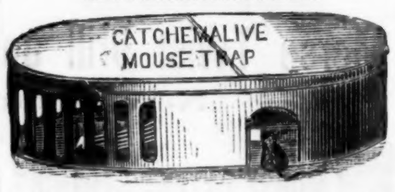
NORWAY SHAPES,

Springs and Steel,

No. 948 Beach St., Philadelphia.

WAR!!

Every Mouse in the World to be EXTERMINATED!



Each Mouse caught re sets the Trap for another

TUBULAR AND OTHER LANTERNS. BRASS AND IRON JACK CHAIN. FOR SALE BY THE TRADE.

R. E. DIETZ,

Patentee and Manufacturer,

54 & 56 Fulton, and 29 & 31 Cliff St., NEW YORK.

ROMER & CO.,

Established 1837.

Manufacturers of **Patent Brass Pad Locks for Railroads and Switches. Also, Patent Stationary R. R. Car Door Locks. Patent Piano and Sewing Machine Locks.**

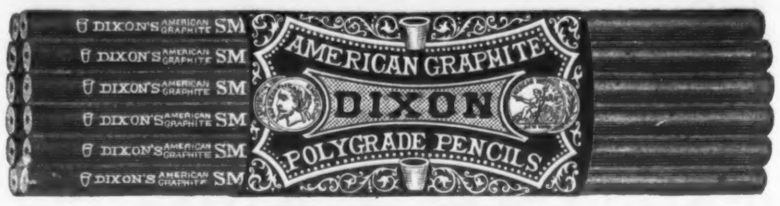
141 to 145 Railroad Avenue, NEWARK, N. J.

Illustrated Catalogues sent on application.

Established 1827.

Paris 1867.

Franklin Inst. 1824.



PATENT DOZEN PACKAGE.

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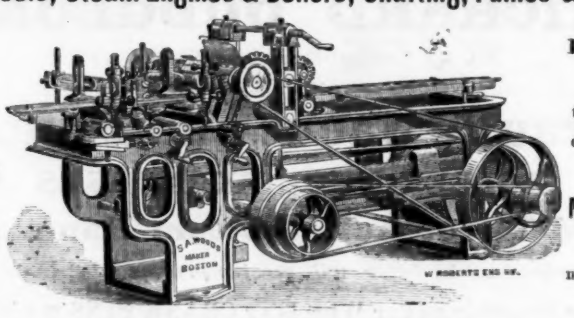

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